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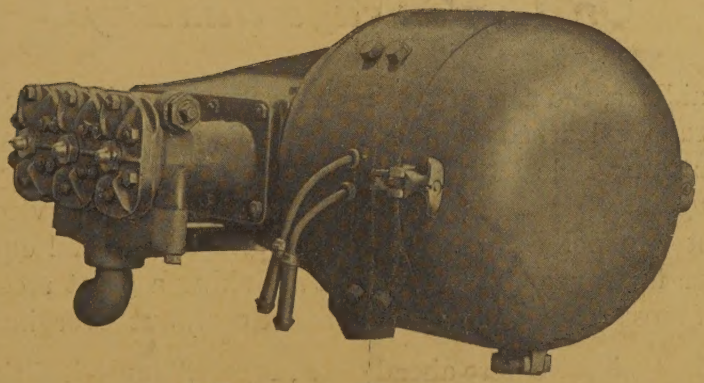
A Remarkable Improvement in Air-Brake Compressor Construction

Half the Size

—

Increased Capacity



Half the Weight

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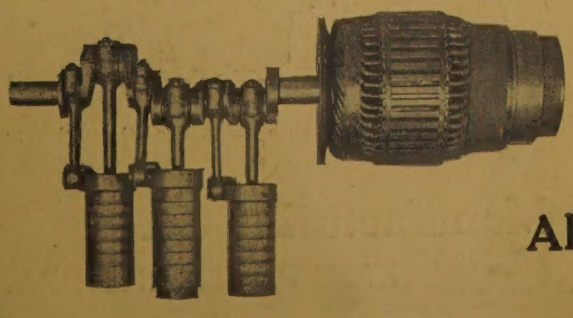
Gearless

The Allis-Chalmers 3

Air Compressor is the crowning achievement of many months of designing, experimenting and testing along scientific lines.

The Allis-Chalmers Company, with its long experience and reputation, presents this compressor as a thoroughly practical piece of apparatus, representing the greatest advance in the history of compressor construction.



Here are some of its most prominent advantages: It weighs but 390 lbs. (425 lbs. with cage complete), as compared with approximately 850 lbs., the weight of the ordinary compressor.

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ALLIS-CHALMERS COMPANY

MILWAUKEE, WIS., U. S. A.

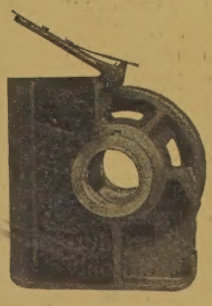
Alphabetical Index and Classified Directory[fourth page following text

"1600 Regulars"

On The Chicago Railways

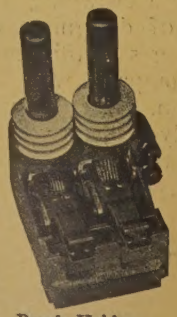
"BOSS," said Joe, the master mechanic to the General Manager, "while I was in Chicago I learned that they have had 1600 Westinghouse 40 h.p. Commutating Pole Motors in service for the past three years, and that the motors '*belong to the regulars*'; they are always ready for service, and their low maintenance cost is unbelievable. They also have had a trial equipment of HL Control in service for a year or two, and it's making a great record. I thought we were ahead of most roads on low maintenance cost, but 'everybody's doing it.'"

"I, too, used to think we were ahead of the others," remarked the General Manager, "but every railroad man I meet tells me that he's doing as well as we are since adopting Westinghouse Motors. They also are all strong for HL Control."



Bearing with Separate Oil Chamber.

Westinghouse Commutating Pole Motor.



Brush Holder with Adjustable Tension.

Platform Controller.

Switch Group, Hand Operated Type

Westinghouse Electric & Manufacturing Co.

Sales Offices in Forty-Five American Cities

EAST PITTSBURGH, PA.

Electric Railway Journal

A CONSOLIDATION OF STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XL NEW YORK, SATURDAY, NOVEMBER 30, 1912 No. 21

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NEW YORK, SATURDAY, NOVEMBER 30, 1912

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STUDY OF CAR SERVICE

Constant study of the service provided and the service wanted is necessary in every electric railway system in order that the proper relation between these two factors may be maintained. Waste car mileage should be eliminated and at the same time service should be furnished in accordance with the reasonable demands of the public. This assumes, of course, that there is sufficient patronage to justify the existence of the street railway system in the community served. It is difficult to measure the losses due to inadequate service in a city of good size, but they are more important than a casual consideration of the subject indicates. They develop principally in the short-distance traffic, which affords the greatest net return per mile of haul. The average person who takes a car for a short ride and gives the prevailing flat city fare therefor is not willing to be discommoded seriously in addition to paying a cash fare of 5 cents for a distance equivalent to a few city blocks. Experimentation with headways is a satisfactory means of testing the patronage of a district that will often reveal unappreciated and undeveloped sources of traffic.

INTERURBAN COMPETITIVE CONSTRUCTION

When the next era of interurban construction begins in districts that do not now enjoy the advantages afforded by such properties it is to be hoped that the projectors will not adopt routes that are too strongly competitive with existing lines of steam railroads where the density of traffic is naturally light. Some of the promoters of interurban roads in the Central Western States made the mistake of constructing the lines so that the only sources of traffic are found at points which are wholly competitive with steam railroads. This competitive condition might be all that could be desired in a region of heavy traffic density, where the through business of a steam railroad demands so much of its facilities that the local business which can be handled better on an interurban electric system goes naturally to that property. In a region, however, where the sources of traffic open to the established steam railroad are so restricted as to limit its revenues seriously the best chance for an interurban railway is in the selection of a route varied from the existing steam right-of-way so as to touch other communities and build up both them and their volume of traffic. This has been done in a number of cases and with such good selection of terminal cities that the resulting success was a general advantage to the community.

CENTRAL ELECTRIC MEETINGS

The change in the number of meetings in the Central Electric Railway Association's scheme of organization appears to be somewhat radical until it is understood. The association will reduce the number of meetings from five to three a year. In doing so, however, it gives the executive committee authority to lengthen the time of each meeting from the one-day session which was the usual practice of

the past to two or more days. It is expected that the amount of business and the programs of papers will require, at least occasionally, two-day sessions. The Central Electric Railway Association is thoroughly representative of the properties which it was formed to include, and its work has been systematized so carefully during the readjustment period through which it has passed successfully that no decrease in the value of its accomplishments for the industry may be feared. A reduction in the number of meetings should produce an increased attendance because there will be fewer gatherings each year. The traveling expenses borne by the companies will be lightened, and while we do not know that anyone has questioned that factor seriously, it is a matter that many railways which send several representatives to such meetings have to consider carefully. Attendance of railway men at association meetings is well worth what it costs, and the most successful arrangement is the one which permits the greatest benefit without undue expenditure of time or money. This result, it is believed, is promised by the new Central Electric Railway Association plan.

THE STRAUS ARBITRATION DECISION

Outside of the general interest to electric railway companies possessed by the decision of the Straus board of arbitration, two points are of special interest to electric railway companies. One of these is that no change is made in the present practice regarding the employment of engineers on electrified steam railroads. The men requested that in such cases the old steam engineers must be taken over and paid the same wages as in steam service. The other point is the recommendation by the board "of the appointment of national and state wage commissions, or labor commissions, which should exercise functions regarding labor engaged at work in public utilities analogous to those now exercised in regard to capital by the public service commissions already in existence." This reopens a very old question which seems as far from solution now as ever. Wage commissions, of course, may be established and their decisions enforced against the companies, but we do not see any practical way of making these decisions enforcible against the employees. In fact, this is just the point at which compulsory arbitration always will break down and always has broken down where it has been tried, as in Australia. Fines are no punishment to a person who has no property, and penal sentences against a large body of men such as would be involved in a railway dispute, say several thousand, are impracticable. Compulsory mediation, indeed, there may be, as under the Canadian law, but no attempt is made there to go further than to investigate the cause of the trouble and make recommendations. Either side is absolutely free to reject the suggestions of the board, and practically compulsory arbitration can go no further than to suggest, unless it is to be compulsory for one side and not for the other. The only real law which can be invoked to settle the question of wages is the ancient one of supply and demand, and the only exact rule by which to determine wages is that sufficient wages must be paid to attract and hold men of the intelligence required to do the desired work. Any enforced departure from this rule is unjust either to the employer or to the employee.

A CAUSE OF WHEEL SLIDING

At the last meeting of the Central Railway Club a paper was presented by John P. Kelly drawing attention to the fact that car wheels when passing over a depression in the track at extremely high speeds could actually leave the rails for a very appreciable distance, and that it was easily possible for the energy of rotation in the wheel to be dissipated sufficiently so that when the wheel again reached the rail opportunity existed for the commencement of sliding. Starting with the assumption of a wheel and axle suitable for heavy passenger equipment and a speed of 60 m.p.h., the rotative energy of the wheel was calculated to be 50,000 ft. lb. With a brakeshoe pressure such as might be expected with high-speed brakes, the wheel would stop rotating were it not for the pull of the rail in a distance of only a little over 30 ft.

Provided the action of the spring supporting the weight of the car upon the wheel was unimpaired, the influence of the wheel to return to the track would be sufficient to make negligible the effect of a depression in the rail of say 1/64 in., but on account of the enormous brake beam pull pressing the journal box against the pedestal it might easily be possible to produce an effect equivalent to locking the boxes between the pedestal jaws and preventing vertical movement. This action would be assisted by the fact that the brakeshoe is generally located below the center line of the axle, and on account of the nearly vertical pull of the hanger in addition to the vertical components of the brakeshoe pressure the result would tend to neutralize the downward thrust of the spring. In this case the calculations show that the wheel would travel some 30 in. before reaching the rail in passing over a depression of only 1/64 in., and in consequence the time interval would permit the brakeshoe to slow down the rotation of the wheel to a very material degree. Thus, when the wheel took the rail after its jump, every tendency, including even the inertia of the wheel itself, would be toward the establishment of the sliding friction instead of the friction of no relative motion which theoretically must always exist between the point of contact of the tire and the rail.

The case in point applies only to so-called high-speed braking systems in which an excessive brakeshoe pressure is applied during the early part of emergency brake application in order to overcome the effect of the decreased co-efficient of friction resulting from the intense heat generated at the surface of contact, the excess air pressure being bled off by means of an automatic slide valve to give a normal pressure when the speed is reduced to a normal figure. The point is, however, well taken.

In the past few years the conditions surrounding the braking of cars and trains have changed very materially. In the light of experience brakeshoe pressures have increased enormously. Yet there has been very little change in the way of making provision for circumstances which have arisen owing to the more severe service. Only within the last year have all the cars on an electric railroad been equipped complete with two brakeshoes on each wheel, so that the thrust from the shoe is balanced, and the plan of carrying the shoes below the center line of the axle is still common. The time has undoubtedly come for a general

investigation into the mechanics of passenger train braking together with the design of foundation brake rigging, and it is to be hoped that in the near future the subject will receive the attention it deserves.

REPORT OF COMMITTEE ON RATES AND FARES

As last year, the American Electric Railway Association will devote a large part of the time at its midyear meeting in January to a discussion of the proper basis for rates and fares and will use as a text for that meeting the report of its committee on that subject. Last year the committee on rates and fares presented a brief report at the Atlantic City convention, and four memoranda appended to the report, prepared by Messrs. Ford, Sergeant, Clark and Bradlee and printed in the issue of this paper for Dec. 2, 1911, gave the basis from which the committee reached its conclusions. This year the same plan has been followed. A brief report was submitted at Chicago, and in this issue the accompanying memoranda of C. N. Duffy, H. G. Bradlee and F. R. Ford are published in abstract.

These monographs treat the matter from three standpoints. Mr. Duffy takes up the question of fares from a theoretical standpoint and determines the percentage return on the investment with a 5-cent fare and the flat rate of fare, with free transfers, necessary to produce 8 per cent return on the investment. Each of these conditions is analyzed, with the assumption of operating ratios of 55 per cent, 60 per cent and 65 per cent, and a ratio of investment per dollar of operating revenues of $4, $5 and $6. To the percentage of operating ratio in each case Mr. Duffy adds 15 per cent for depreciation, 1 per cent for contingencies and 6 per cent for taxes, making, in the case of the 65 per cent operating ratio, a total of 87 per cent which must be taken from the receipts before there can be any reimbursement for capital. Consequently on each 5-cent fare, with the 65 per cent operating ratio, 4.35 cents must go for these charges, leaving only 0.65 cent for profit. Then on a basis of $4, $5 or $6 investment per $1 of receipts, or in other words of 20 cents, 25 cents and 30 cents investment per 5-cent fare, Mr. Duffy shows that the 0.65 cent profit per passenger would be only 3.25 per cent on the 20-cent investment, 1.55 per cent on the 25-cent investment and 0.42 per cent on the 30-cent investment. In a similar way, the passenger returns with 60 per cent and 55 per cent operating ratios were determined, and by a reversion of the process the flat rate of fare with free transfers necessary to produce an 8 per cent return on the investment with the foregoing assumption was deduced.

Mr. Bradlee, working entirely independently of Mr. Duffy, presents some figures from actual properties. In Mr. Bradlee's data and assumptions $3.94 per dollar of gross earnings is found to be the average investment, and 4½ per cent of the investment, or 17.64 per cent of the gross revenue, is assumed as the necessary charge for depreciation, obsolescence and taxes. From these data the maximum length in half trips for profitable operation is determined by the formula suggested by Mr. Bradlee last year and is found to vary, in the twenty selected companies, from 1.21 miles to 4.54 miles.

Mr. Ford makes an interesting comparison between the rates per mile on typical surface systems, on rapid transit lines and in steam railroad commuter service. The rates per mile of a possible ride in each 5-cent zone compare with remarkable closeness in the four cities selected, New York, Chicago, Philadelphia and Boston, and are shown to be less than the commutation fares on the steam railroad suburban service and to be less than half of the ordinary fare per mile, taking as the ordinary fare one-half the excursion fare.

The committee in its combined report concludes, we think with reason, that the street railways of the country, as a whole, are "selling goods below cost" and recommends for each company which is so doing the adoption of one of the plans suggested last year for an increased fare per passenger mile. These were either some form of zone system, or an extra charge of some kind for transfers, or an increase in the 5-cent fare.

It is an interesting fact that the results of this study should be made public coincidently with the report on valuations and the establishment of rates by the Association of Railway Commissioners in Washington, Nov. 19-22. While the discussion on these subjects at Washington, so far as electric railways are concerned, was not extensive, we believe that electric railway companies should feel encouraged at the expressed opinions there that the companies are entitled to a rate sufficient to provide for depreciation and keep their investment intact and to provide a reasonable return on a fair valuation of the property. The principal question in Washington was whether the "fair" valuation should be "investment" or "the cost to reproduce new, less depreciation," and it is interesting to note that some of the Western commissioners urged the former plan in steam road valuations because the appreciation, particularly of real estate, made the valuation upon this basis greater than the investment. According to the committee's report at Washington, the question of the proper method to follow in valuations is still very much confused. But if the courts continue to recognize the validity of "going value" as a capital charge, as they have in the Knoxville water case and the Consolidated Gas case, one thing is certain. This is that in the proportion in which the companies are prohibited from capitalizing the cost of establishing their systems, including the cost by obsolescence, in just such ratio are the risks of a railway enterprise increased, and the percentage which constitutes a reasonable return on the investment must be so much the larger. For example, if the companies should be allowed to capitalize every development expense and those brought around by changes in the art, as it is reported that the steam railroads in Great Britain have done, it is reasonable to fix the rates so that they will earn a smaller return on this enlarged capitalization than if the companies were obliged to amortize the cost of these changes. In that case the business would be more hazardous. Of course the franchises of many companies limit the rate of fare, but we do not consider this by any means an insuperable obstacle to an increase in the rates in any state, provided the legislature recognizes that the facts justify such an increase. The courts have held repeatedly that a succeeding legislature can alter the acts of those which have preceded it, and if the companies can present a good case for an increase in their rates of fare and can decide the best form which that increase should take, we know of no legal reason why a legislature should not be able to remedy the trouble.

Notes on the Windsor, Essex & Lake Shore Rapid Railway

Maintenance Records Are Given for Canada's First Single-Phase Railway—The Company Has Developed a Large Interurban Passenger and Freight Business

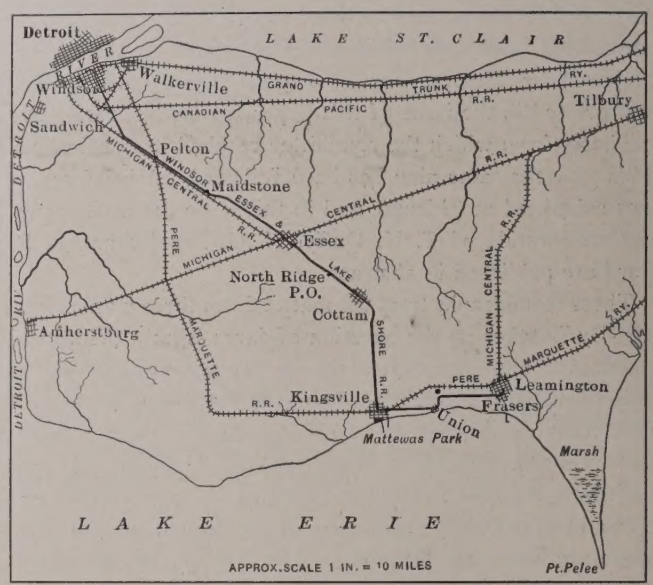
The Windsor, Essex & Lake Shore Rapid Railway is a single-track line extending from Windsor to Leamington in the Province of Ontario, with a total trackage of 40 miles. The line has been operated since 1908 and has the distinction of being the first and only single-phase railway in Canada. The operating conditions are simple, as may be judged from the fact that the country is of level character with the exception of a 5 per cent grade near Kingsville. Twenty-six miles out of the 37 miles of route are on private right-of-way, but in spite of this there are few curves. The following paragraphs will present some figures on the maintenance cost of the electrical features of this road and also a description of the freight and passenger business development. A description of the original equipment of this line, as installed on the 28-mile division between Windsor and Kingsville, was published in the STREET RAILWAY JOURNAL for Jan. 11, 1908.

LINE AND TRACK

The line construction is of the catenary type with cross-span suspension in towns. The poles are 120 ft. apart on tangents and as close as 80 ft. on curves. The material is of Westinghouse standard type, consisting of a steel messenger wire with hangers spaced 10 ft. apart, No. 000 grooved trolley wire, wooden-arm steady strains at curves, etc. In general the line is anchored at every thirty poles. This catenary carries current from the power house to the substation at Maidstone, 18 miles distant, at 6600 volts, which voltage is also used for the trolley service throughout.

The maintenance records for 1908 and 1909 do not show the charges made specifically for the upkeep of the line and bonding, but for the following fiscal years ended June 30 the amounts spent were as follows: $2,084.26 for the year 1910; $1,650.79 for 1911; $1,808.58 for 1912, a total of $5,543.63, or an average of $46.19 per mile per annum. Other figures by months were as follows: July, 1911, $174.66; July, 1912, $73.53; August, 1911, $179.58, and August, 1912, $145.53. These figures are not chargeable entirely to line and bonding account because the three linemen have plenty of time available for other work. The excellent behavior of the catenary construction will be best appreciated from the fact that in nearly five years of service only one or two wire breaks have occurred and it has been unnecessary to replace any material whatsoever. Most of the expenses charged were due to the installation of additional material such as strains at curves, hangers, switches, etc. Pantograph current collectors are used, and it is figured that the trolley wire is good for three to five years more. It is probable that the replaced line construction will consist of a copper catenary and a steel trolley wire. An idea of the conditions which the catenary construction has met successfully is shown in two accompanying pictures taken during a severe snowstorm in March, 1912.. The snow-fighting equipment shown in one view consists of an ordinary flat car which was fitted with nose plows at each end.

It has not been found necessary to make any track replacements or the like, but the roadway has been greatly improved by being reballasted with spoil from the company's gravel pits.



Canadian Single-Phase Railway—Routes of Windsor, Essex & Lake Shore Railway and Nearby Steam Railroads

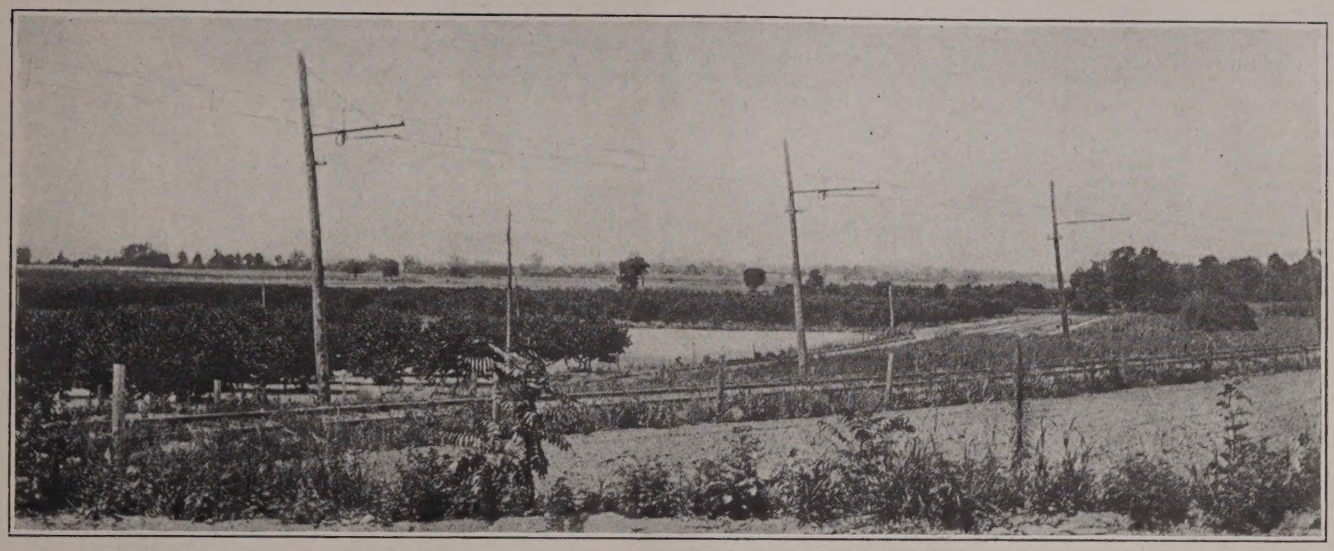
Canadian Single-Phase Railway—Flat Car, Snow Plow and Locomotive

Canadian Single-Phase Railway—Bucking a Snowdrift in Open Country

POWER HOUSE

The generating equipment of the power house at Kingsville consists of two Goldie-Corliss cross-compound engines, operated at 125 r.p.m. and direct-connected to 500-kw, 25-cycle, 13,000-volt single-phase generators, which are furnished with 6600-volt taps for the trolley line. These engines have required so few repairs that the total expense for five years' operation has been less than $50. The repair expense to the generators would be covered by about $100, the cost of four or five coil burn-outs.

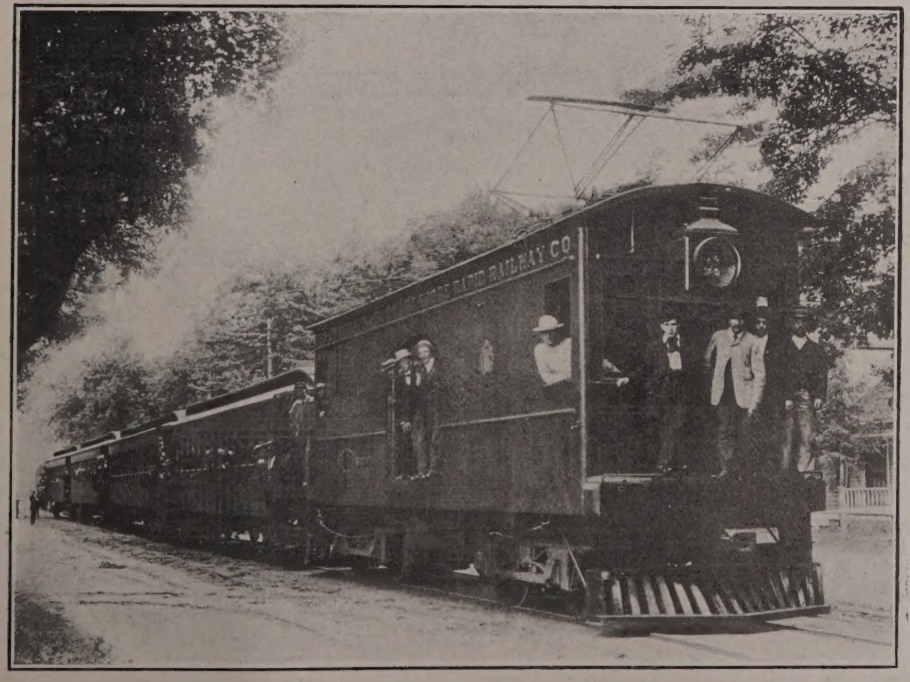
Perhaps the most interesting feature of the station is the use of natural gas for the four 360-hp Canada water-tube boilers. Each boiler has seven Gwynne burners which have three cocks whereby the amount of fuel supplied to the boiler is regulated as easily as with a domestic gas stove. A slide valve at the end of each burner tube is manipulated to change the air mixture until a perfect blue flame is secured. The gas is obtained from the wells at 500-lb. pressure and is reduced to 8-oz. pressure at the boilers. Its fuel value is 11,000 b.t.u. per cubic foot. The boilers are operated at 140 lb. to 150 lb. steam pressure. The amount of attendance which these boilers need is so little that only one night man and one day man are required except for the occasional help of a cleaner from the engine room. In fact, the entire staff of the boiler station consists of but three day men and two night men. The use of natural gas as fuel has a'so proved an excellent thing from the maintenance standpoint because so far no replacement material has been required except a few bricks for the settings. A view of this boiler room is shown in one of the accompanying illustrations.



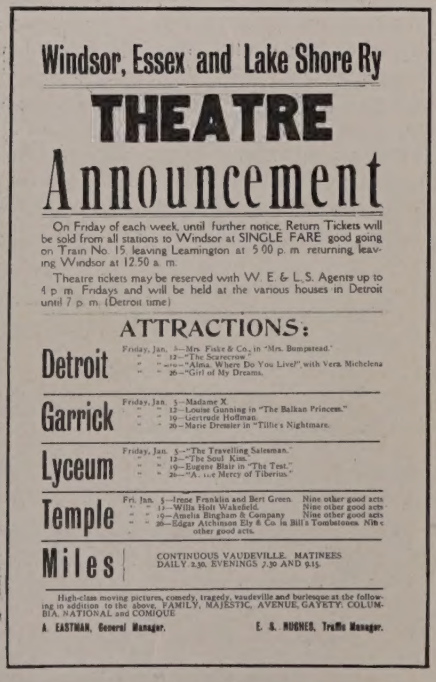
Canadian Single-Phase Railway—Typical Catenary Construction on Right-of-Way

ROLLING STOCK

The original rolling stock consisted of five 55-ft. interurban type motor cars, four passenger trailers formerly used in elevated railway service, two baggage trailers and one electric locomotive. The passenger cars are each equipped with two 100-hp Westinghouse-132 straight single-phase motors, and the electric locomotive has four 100-hp motors of the same type. A similar equipment of four 100-hp motors has been furnished for the new combination express and locomotive car. The company also keeps four spare motors on hand. In general, the motors have always



Canadian Single-Phase Railway—Locomotive Car with Four Trailers



Windsor, Essex and Lake Shore Ry

THEATRE

Announcement

On Friday of each week, until further notice, Return Tickets will be sold from all stations to Windsor at SINGLE FARE good going on Train No. 15 leaving Leamington at 5.00 p. m. returning leaving Windsor at 12.50 a. m.

Theatre tickets may be reserved with W. E. & L. S. Agents up to 4 p. m. Fridays and will be held at the various houses in Detroit until 7 p. m. (Detroit time)

ATTRACTIONS:

Detroit — Friday, Jan. 5—Mrs. Fiske & Co., in "Mrs. Bumpstead." " " 12—"The Scarecrow." " " 19—"Alma, Where Do You Live?" with Vera Michelena " " 26—"Girl of My Dreams."

Garrick — Friday, Jan. 5—Madame X. " " 12—Louise Gunning in "The Balkan Princess." " " 19—Gertrude Hoffman. " " 26—Marie Dressler in "Tillie's Nightmare."

Lyceum — Friday, Jan. 5—"The Travelling Salesman." " " 12—"The Soul Kiss." " " 19—Eugene Blair in "The Test." " " 26—"A Lion Mercy of Tiberius."

Temple — Fri. Jan. 5—Irene Franklin and Bert Green. Nine other good acts " " 12—Willa Holt Wakefield. Nine other good acts " " 19—Amelia Bingham & Company Nine other good acts " " 26—Edgar Atchinson Ely & Co. in Bill's Tombstones. Nine other good acts.

Miles — CONTINUOUS VAUDEVILLE. MATINEES DAILY 2.30. EVENINGS 7.30 AND 9.15.

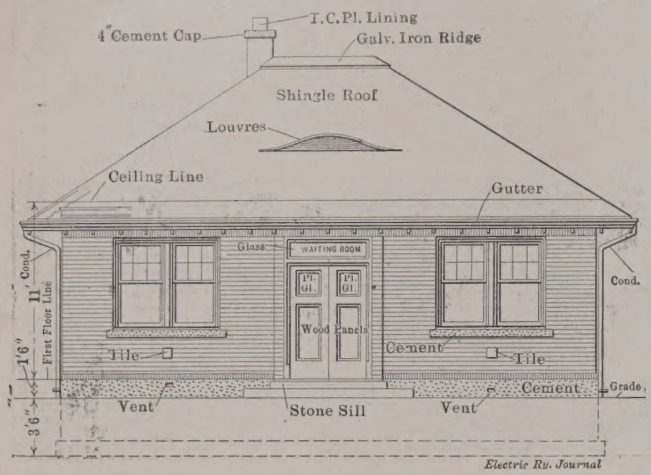
High-class moving pictures, comedy, tragedy, vaudeville and burlesque at the following in addition to the above, FAMILY, MAJESTIC, AVENUE, GAYETY, COLUMBIA, NATIONAL and COMIQUE

A. EASTMAN, General Manager. E. S. HUGHES, Traffic Manager.

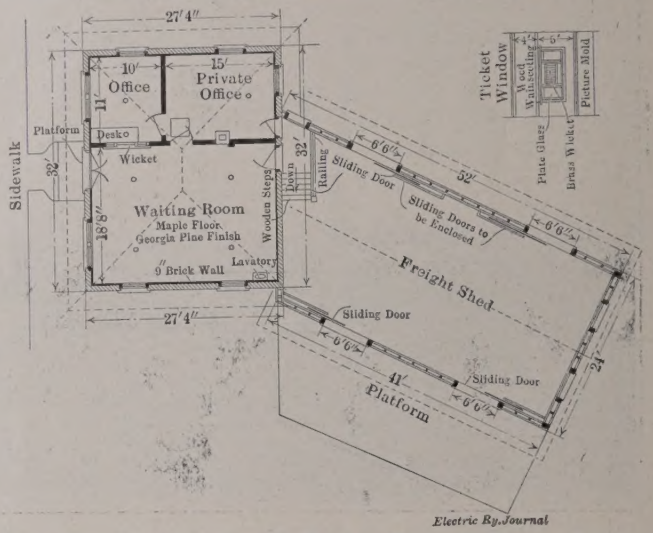
Theater Service Poster

proved capable of meeting the conditions for which they were designed except that under excessive overloads they do not accelerate so quickly as a d.c. motor. The only trouble given by the original type was due to the breaking off of the thin leads at the commutator. The original coils were therefore replaced with coils with thicker tips, and no further trouble has been experienced. The company does all its coil winding and baking and also slots all commutators. The pantograph shoes are home-made.

For the year ended June 30, 1911, the cost of maintaining

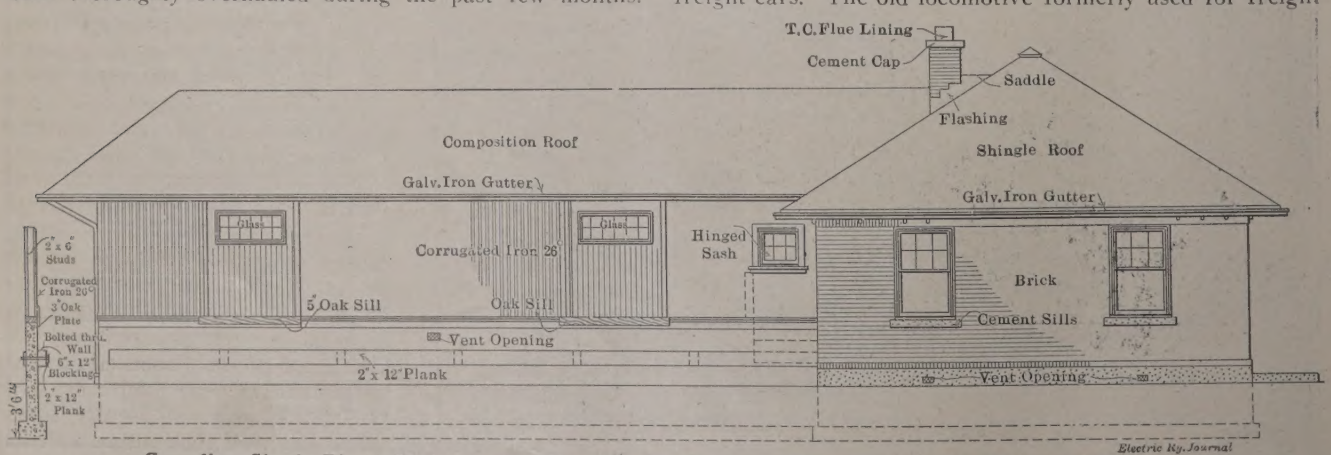


Canadian Single-Phase Railway—Waiting Room of Station at Essex



Canadian Single-Phase Railway—Plan of Essex Station Showing Passenger Waiting Room and Freight Shed

the electrical equipment of the cars was $6,793.47 and for the following fiscal year $4,899.88. During the fiscal year ended June 30, 1911, the company operated 266,063 passenger miles and 80,903 freight and miscellaneous miles, making a total of 346,966 miles, and for the following year 273,380 passenger miles and 85,223 freight and miscellaneous miles, making a total of 358,603 miles. Approximately 2 per cent of the passenger mileage included trailer service. In accordance with these figures the maintenance cost of electrical equipment of cars was $19.57 per 1000 miles for the year ended June 30, 1911, and $13.66 per 1000 miles for the year ended June 30, 1912. It is believed that the cost will be appreciably less during the next few years, owing to the change in armature coils and because the cars have been thoroughly overhauled during the past few months.



Canadian Single-Phase Railway—Longitudinal Elevation of Essex Freight and Passenger Depot

The company feels that it has every reason to be satisfied with the behavior of the car apparatus.

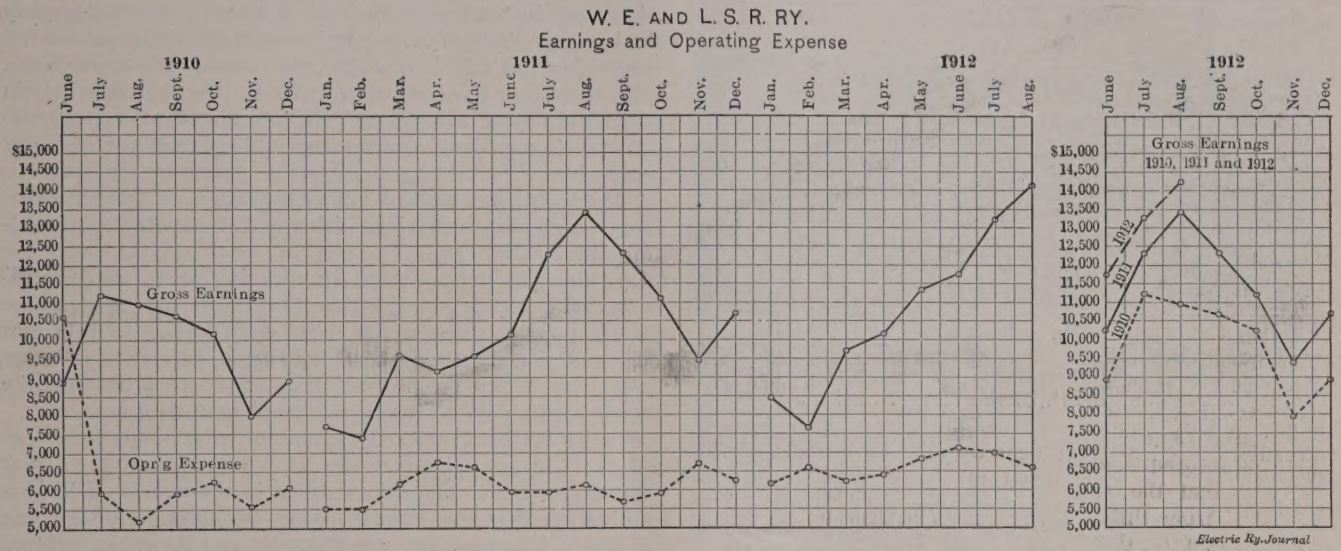
PASSENGER AND FREIGHT BUSINESS

The company operates nine passenger trains a day each way between Windsor and Leamington, a distance of 36.6 miles, and one extra passenger train each way between Kingsville and Leamington, a distance of 8.7 miles. Two of these trains are limiteds except on Sundays, when all trains are locals. The local trains make the run from Windsor to Leamington in one hour and forty-five minutes and the limited trains in one hour and twenty-five minutes. The institution of limited train service increased the company's passenger business about 20 per cent.

In addition the company operates each weekday two express and freight trains each way. These are scheduled to make the trip between Windsor and Leamington in two hours and ten minutes in one direction and one hour and fifty-five minutes in the opposite direction. Before December, 1911, less-than-carload express and freight service was run with passenger cars to form an accommodation train. This service hindered the passenger business to a great degree, and the running time between Leamington and Windsor was two hours and fifteen minutes. This train was therefore replaced by the limited service mentioned, and arrangements were made to handle the less-than-carload business by the new combination express and freight car, which also hauls standard freight cars twice a day on regular schedule. The latter arrangement saves a great deal of mileage as compared with the former method of having a locomotive make a special trip for individual freight cars. The old locomotive formerly used for freight service is now employed for general utility service, including the hauling of passenger trailers, as shown in one of the accompanying illustrations.

The company's rates for passenger business vary in accordance with the class of tickets sold. The single fare charged is based at the rate of 2½ cents per mile with a maximum fare of 5 cents within the limits of a city or town. Round-trip single-ticket fares are sold at the rate of 2 cents

a mile. The commutation tickets, which are good for thirteen round trips in the hands of any member of the family named on the ticket, are sold at the rate of 1¼ cents per mile. There is also a cash coupon ticket, consisting of 300 5-cent coupons, which is sold for $10. These tickets may be detached only by the conductor, and the passenger must sign a contract in ink and identify himself as the original purchaser whenever requested to do so by the conductor. The coupon book expires one year from date of purchase, but an expired and partially unused book may be redeemed if presented within fifteen months from the date of sale. In case of such redemption full fare is computed for all coupons which have been used and the remainder of the original purchase cost is the redemption value. This coupon ticket has been in force since July 1, 1911. The only reduced rate ticket which is compulsory is under the auspices of organized associations are entitled to round-trip rates at the single-fare price. Special cars are also furnished under a stated schedule, plus $2 per hour or fraction thereof if the car is in service after 11 p. m. Special cars are not furnished on holidays or Saturdays if they are likely to interfere with the regular schedule. Cars for parties of not more than fifty persons are also furnished at special rates.


W. E. AND L. S. R. RY.
Earnings and Operating Expense
1910
1911
1912
1912
June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug.
June July Aug. Sept. Oct. Nov. Dec.
$15,000 14,500 14,000 13,500 13,000 12,500 12,000 11,500 11,000 10,500 10,000 9,500 9,000 8,500 8,000 7,500 7,000 6,500 6,000 5,500 5,000
Gross Earnings
Opr'g Expense
Gross Earnings
1910, 1911 and 1912
1912
1911
1910
Electric Ry. Journal

Canadian Single-Phase Railway—Curves Showing Ratio Between Gross Earnings and Operating Expenses, and Increase in Gross Earnings

Canadian Single-Phase Railway—Boilers Operated with Natural Gas for Fuel

a school ticket with no hour limit, which is sold at a rate equivalent to 1 cent per mile. These tickets are sold in books of forty-six and are valid for two months from date of sale. To non-holiday parties of ten or more traveling together round-trip tickets are sold at one and one-third times the one-way fare. Such parties must travel together going, but can return separately, and the tickets are limited to date of sale only. Excursions of 100 or more guaranteed

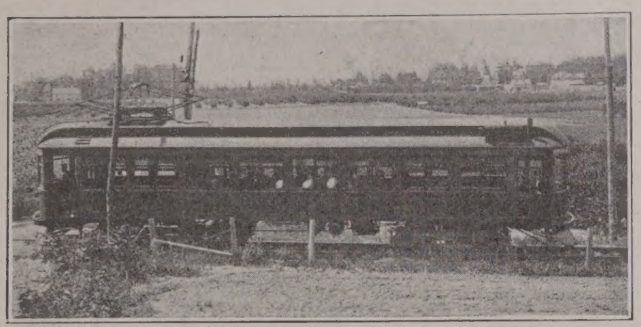
The principal source of pleasure traffic on this line is furnished by Mattewas Park, on Lake Erie, at Kingsville. This is a beautiful playground with an excellent bathing beach, an artificial terrace and a fine casino. The latter is an ideal place for picnics, meetings and one-day conventions. The casino dance hall is the largest and best in this part of the country, and so forms one of the principal summer attractions. The casino contains a restaurant where, by special arrangement, chicken and fish dinners are served at 75 cents each. Lunches or dinners are also arranged for private parties. The park has always been operated with the idea of attracting the best class of patrons, and in this object the company has succeeded admirably.

In winter the tide of pleasure travel is toward the Detroit theaters. As shown in the accompanying reproduction, the company issues a poster each month listing the attractions at these theaters and naming the theater train, which is run on Friday of each week. Theater train round-trip tickets are sold from all stations to Windsor at single fare, but their use is limited to the specified going and returning trains. Theater tickets may be reserved with the railway company's agents up to 4 p. m. Fridays and are held at the various houses in Detroit until 7 p. m. Detroit (Central) time.

As noted from the mileage figures previously quoted, the company does considerable freight business, most of which consists of local products like tobacco, grain, hay and live stock. Besides handling local business the company has through billing arrangements and physical connections with the Canadian Pacific and Père Marquette Railroads, with which it prorates in accordance with the regular steam railroad classification. Where there is competition with the steam railroads the electric railway usually gets the business because it gives two deliveries a day compared with one delivery by the steam railroads. The freight business has been built up by personal solicitation among the local men, who are asked to specify the electric railway for all through routing.

The company has a large freight terminal at Windsor, a transfer station at the junction with the Canadian Pacific Railroad, a freight house at Leamington and a yard for live

stock at Cottam. It has recently completed at Essex the handsome combination passenger and freight station shown in the accompanying drawings. The station building, 32 ft. x 27 ft. 4 in. in area and constructed chiefly of brick, contains a waiting room and offices. It is adjacent to a corrugated-iron freight shed, which is 52 ft. long at the wagon delivery side and 41 ft. long at the track platform side.



Canadian Single-Phase Railway—Standard Passenger Car

On this line the growth of the freight business is merely a question of facilities. Thus the new express car has already secured a great deal of new business, and it is believed that the new depot at Essex will increase the earnings from this branch by about 50 per cent. It is likely, therefore, that additional sidings and freight houses will be built in the near future.

GENERAL

The improving financial condition of this property is indicated by the fact that the operating expenses for the fiscal year ended June 30, 1911, were 63.27 per cent, and for the fiscal year ended June 30, 1912, 59.52 per cent of the gross earnings, in spite of the large amount of rehabilita-

Canadian Single-Phase Railway—Mattewas Casino on Lake Erie

tion. The curves on page 1099 show by months how the gross earnings have increased and the proportion of operating expenses has decreased since June, 1910. The improvements have been made under the direction of Albert Eastman, general manager, who created and built up the freight and express business of the Utica (N. Y.) & Mohawk Valley Railway before assuming the management of this Canadian property.

In power plants equipped with stokers which are liable to be suddenly called into service oil is sometimes used to carry the load at starting and at the same time ignite the green coal on the stoker. In such cases the oil burner is mounted with swinging joints and when called into use is swung from its position at the side of the boiler and places its fire over the bed of coal until it has been properly ignited. After the coal fire is well under way the oil burner is swung out of position and the burner opening in the side of the fire box is closed by a firebrick.

TESTIMONY BEFORE CHICAGO BOARD OF ARBITRATION

Owl car service was discussed at the meeting of the board of arbitration in the Chicago City Railway wage case on Nov. 19. William M. Weatherwax, superintendent of transportation of the Chicago City Railway, discussed this topic in his testimony. He declared that the company had no age limit in hiring trainmen, although he could not remember having hired a man older than forty-eight years. The minimum was twenty-one years. He said that he had often employed men whose hair was tinged with gray, and that such men had a steadying influence on the younger employees.

The board has made a ruling that the evidence concerning wages paid in various cities of the country is not admissible in this case.

Justice Orrin N. Carter, in speaking about the arbitration, said that it showed that there was not much merit in the popular demand for court procedure. He said that his experience in this case convinced him that if there were not firmly established rules of court procedure the courts would be very much worse off than they now are.

James Hall, a chartered accountant, who audits the books of the Chicago City Railway as a representative of both the city and the company, testified in the course of his examination that the company kept two sets of books, one in which it carried the city accounts and the other relating merely to the distribution of the profits made by the company.

Mr. Weatherwax testified at the meeting which was held on Nov. 20 that he believed that five grades should be continued for the employees and that a trainman did not reach full efficiency before the end of five years. He suggested that the first wage period be made three months instead of six.

During the proceedings on Nov. 25 Mr. Moore said that so much time had been spent in discussion of the system of accounts that the fact that the employees were asking for an increase in wages and improved working conditions appeared to be lost to sight.

James Hall, the accountant engaged by the city and the company to examine the books, was cross-examined by Judge Scanlan, who sought information regarding the capital account of the companies under the 1907 ordinances. Judge Scanlan asked why the original property account was not written off the books as the property which it represented was replaced; instead of this treatment the cost of rehabilitation was charged to the capital account. He asked if a reputable business house would not write such capital off its books if the property was replaced or destroyed. Mr. Hall replied that in some forms of business it was optional whether or not the amount should be written off, but in no case would it be compulsory, and it was perfectly legitimate to carry it there. It was capital invested and lost. The ordinance provided for this treatment of the cost of rehabilitation. Mr. Hall added that all corporations kept private books. He declared that the general books showed a complete financial history of the company in its dealings with the city but not in its relations to stockholders. Attorneys for the company and the men presented arguments on the question of whether the company should produce its private books. Mr. Moore said that the financial standing of the company was an incidental matter and that the real question was whether it was paying its employees fair wages and whether they were entitled to greater compensation. He said that what the company did with its money made no more difference than what the city did. The arbitrators might as well look into the private books of one as the other. On Nov. 26 the board decided to make a personal examination of the books. President Busby said it was welcome to do so.

Cleveland Center-Entrance Trail Car

A Description of One of the Single Center-Entrance Trail Cars Recently Put in Service on the Cleveland Railway—Unusual Features Include Door-Operating Mechanism, Trucks and Seating Arrangement

In order to reduce the congestion in the downtown district and at the same time offer an increased seating capacity on seven of the heavy traffic lines in Cleveland, Ohio, at a minimum cost of operation, the Cleveland Railway Company recently purchased 100 center-entrance trail cars. These cars are being coupled to the standard motor cars during the morning and evening rush hours, thus affording seventy-two additional seats per car at an increased operating cost of an extra conductor and increased energy consumption necessary to pull the car filled with passengers. As these cars have center entrances and the floor is only 29 7/16 in. above the rail, the time required for exit and entrance of passengers is low. Although the seating and standing capacity of the trail car is somewhat in excess of that of the motor car, this extra seating capacity seems to cause no delay.

The principal dimensions of the new trail car include the following:

Length of body over all	49 ft. 0 in.
Width over sills	8 ft. 2 in.
Width over belt	8 ft. 4 in.
Width of door opening	5 ft. 6 in.
From rail to first step	15 in.
From first step to floor	14 7/16 in.
Height rail to top of roof	10 ft. 8⅛ in.
Truck centers	26 ft. 0 in.
Wheel base	4 ft. 4 in.
Diameter of wheels	22 in.
Weight of car body (without heater)	18,640 lb.
Weight of body per seat	286 lb.

CONSTRUCTION DETAILS

The car body is of semi-steel construction and of monitor-deck design with a single center entrance. In order to drop the car floor to a point where only two steps would be required to reach it, special construction features were necessary in the design of the underframe and trucks. The underframe is of a built-up steel construction with a continuous angle forming the side sills and end sills. The entrance side is formed of a 4-in. x 4-in. x ½-in. angle, and the cross beams and diagonal bracing are 4-in. 5¼-lb. channels and ⅜-in. x 3-in. straps respectively. The diagonal bracing in the underframe was included in the design to assume the tensile strains coming from the radial couplers and center entrance. The bumpers are formed by a 6-in. 8-lb. channel, supported and braced by extending the center sills outside the circular end sills and adding two diagonal braces to the bumper. The single entrance required no change in the design of the underframe on the blind side, it being of the usual fish-belly type, but the method of framing around the entrance on the entrance side is unusual. The side sill is dropped 15¼ in. across the entrance so as to form the first step, and a supplementary 3½-in. x 4-in. x 5/16-in. angle, offset 13 in. toward the center of the car body from the fifth post, forms the sill for the floor around the entrance well. In addition, a 4-in. x 3-in. x 5/16-in. angle is placed over the center entrance and connected to the depressed 4-in. x 4-in. angle side sill in the underframing by a 4-in. channel strut on each side of the opening.

The sides of the car body are of the plate-girder design, being built of ⅛-in. open-hearth re-rolled steel plates 36 in. wide. These are reinforced at the top by two ¼-in. x 3-in. straps, riveted to each side, and the bottom of the plate is attached to the 4-in. angle side sill. The plate is stiffened by two 1¼-in. x 1¼-in. x ⅛-in. angles, to which the intermediate posts are bolted. The sheathing of the three end panels of the car is bolted to the framing instead of being riveted, so that they may be removed easily in case they become damaged.

Cleveland Trail Car—Interior View

Automatic radial couplers are bolted directly to the center sills of the underframing and are arranged to permit practically a full semi-circular swing of the coupler on the ⅝-in. x 4-in. circle bar. In the design of the underframe, provision was made for operation around a minimum radius of 32 ft. 4¼ in. The bolsters and needle beams are of built-up steel-plate design.

There are seventeen drop sashes on the blind side of the car body and fourteen on the entrance side. The two sash openings on each side of the entrance are of sufficient width to receive the two sliding doors. These sashes are double,

Cleveland Trail Car—Side View Showing Center Entrance and Interior Step

the space between them forming the door pocket. A post divides the doorway into an entrance and an exit side. The monitor-deck roof construction is of wood, reinforced with steel carlines and covered with the usual sheathing and painted canvas roofing. The deck sashes are glazed with imitation bevel chipped glass in cherry frames. The hoods are of the monitor type.

INTERIOR ARRANGEMENT

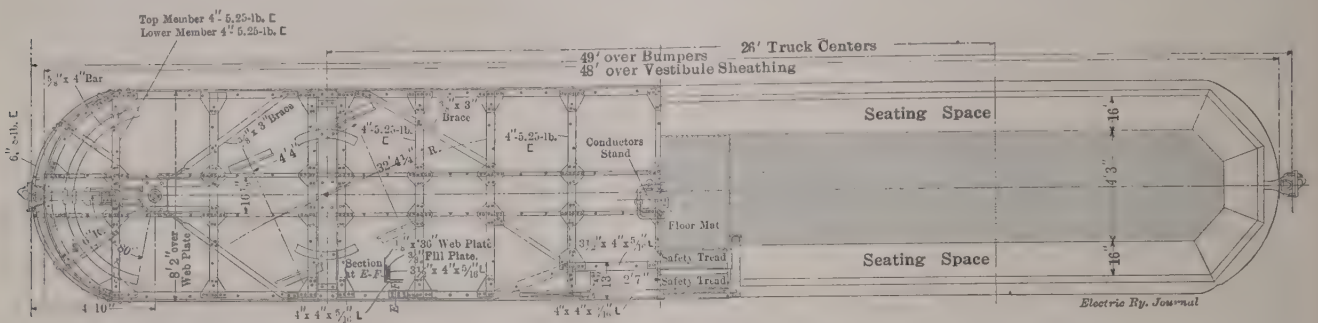
The car interior is encircled with a continuous longitudinal seat so that the maximum seating and standing capacity is obtained. This seat is upholstered in rattan. Hand straps are provided along the lower deck rail and are attached to it by brackets installed at 15-in. intervals. Two pipe stanchions extending from the floor to the lower deck rail flank the center entrance, and as two branches lead from these stanchions to the sides of the entrance, hand holds are provided for the passengers when boarding and alighting.

The conductor's stand is situated in the center of the car and includes a frame formed of 1-in. pipe, which supports a Cleveland fare box and a small shelf for making change. Push buttons for the electrically controlled air-operated doors and for signaling to the motor car also have been installed on the change shelf. The conductor's starters open and close both doors at one time and actuate light signals which advise the motorman as to the position of the doors. In addition to a folding hand brake installed at the conductor's stand for use in emergencies, semi-automatic air brakes were included. These are operated by the motorman from the propelling car as straight air brakes.

In order to reduce the time of boarding to a minimum the new trail cars are operated both pay-as-you-enter and pay-as-you-leave. Both doors are thrown open in the downtown district in the rush hours. Those passengers boarding on the entrance side deposit their fares in the fare box, while those boarding by way of the exit door deposit their fares in the box when they leave the car. This method of fare collection was adopted in order to reduce the congestion at the entrance and, at the same time, to give the conductor more time to make change and collect fares. His position in the car enables him to block the passageway between the two ends of the car, and little trouble is experienced in this method of operation.

General illumination is obtained from four five-lamp clusters installed at uniform intervals in the center of the upper deck ceiling. Five lamps, one on each side of the entrance and three in the deck ceiling at the entrance, illuminate this portion of the car for boarding and alighting. Push buttons, installed at a convenient height on the posts between the windows, ring a signal bell mounted on the lower deck rail near the conductor's stand. Heat is provided in ninety-nine of the cars by forced circulation coal heaters, and one car is fitted with a forced circulation electric heater, all of the Peter Smith Heater Company type. The interior trim is in cherry of the sanitary pattern with "Galco" wainscoting. The exterior finish is in the railway company's standard colors.

The height of the floor above the rails is reduced to a minimum by an especially designed truck. This comprises a modified Brill No. 57 trail type with 22-in. wheels. The unusual features include a reduction in the truck frame so as to provide a 4-ft. 4-in. wheelbase and a shortening of the brake levers so as to limit the vertical clearance to 22 in. Each side frame is cast in one piece, including pedestal, tie-bar and frame columns, and no end frames are used. The frame rests on the journal springs and carries its load on a one-piece cast-steel bolster of the usual swing type. A plan showing the underframing and seating arrangement as well as an exterior and interior view of the car is included in the illustrations.



Cleveland Trail Car—Plan Showing Floor Arrangement and Bottom Framing

The design of the car was prepared by the Cleveland Railway Company under the supervision of T. Scullin, master mechanic. Equipment was supplied as follows:

Couplers	Tomlinson automatic radial
Signal devices	Consolidated Car Heating Company
Pneumatic door-operating and control mechanism	Consolidated Car Heating Company
Electric couplers and jumper cables	Consolidated Car Heating Company
Air brakes	Westinghouse semi-automatic
Trucks	Brill 57
Journal boxes and center bearings	T. H. Symington Company
Hand brakes	Pittsburgh drop handle
Fare box	Cleveland Fare Box Company
Heaters	Peter Smith Heater Company

NEAR-SIDE STOPS DISCUSSED IN OMAHA, NEB.

The management of the Omaha & Council Bluffs Street Railway has been requested by the Commercial Club and the Automobile Club to make the near-side, instead of the far-side stop now effective in Omaha, Neb. This change was agitated about two years ago but was dropped as the railway company objected. This time the management was invited to make known the reasons for its objection to the near-side stop in a public hearing held at the Commercial Club rooms. Previous to the hearing considerable data were collected by the company regardless of whether it intended to advocate the near-side stops or not. These data showed that near-side stop operation was successful in some localities, but in others it had been abandoned after a short time. The management, so far as expense, safety and convenience were concerned, was unbiased, but as a matter of convenience to the public it objected to stopping on the near side in unpaved streets.

One of the objections offered against the far-side stop by the club members was that it was dangerous. An investigation of a total number of accidents over a given period tended to refute this argument. It was found that out of a total of 122 accidents fifty-one occurred outside the business district but between crossings, and thirteen at street crossings. Another interesting point of objection from the public standpoint, presented by the management, was its effect on corner business. Certain stores were paying larger rent than others similarly situated, because of the business gained from waiting passengers. At the conclusion of the conference the railway company agreed to submit the proposition to a referendum vote. Ballots will be supplied to its patrons and ballot boxes provided on the cars. The result of this vote will decide whether operation is to be with near-side or far-side stops.

Report of Committee for Determining the Proper Basis for Rates and Fares

This Report, Just Made Public in Complete Form, Contains Three Discussions of the Subject—C. N. Duffy Presents a Hypothetical Treatment, H. G. Bradlee Supplies Figures from Existing Railways and F. R. Ford Submits a General Treatise on Fares in New York, Chicago, Philadelphia and Boston

At the session of the American Electric Railway Association at Chicago, Oct. 10, the committee on determining the proper basis of rates and fares presented a brief report but announced that its complete report would be made public later. This report is now available. The committee consisted of Frank R. Ford, chairman; C. S. Sergeant, C. N. Duffy, William J. Clark, James F. Shaw, E. C. Foster, H. G. Bradlee and R. J. Todd.

For the convenience of readers the report, as published in the ELECTRIC RAILWAY JOURNAL for Oct. 11, 1912, is reprinted below. Then follow abstracts of the three discussions by Messrs. Duffy, Bradlee and Ford.

REPORT OF THE COMMITTEE

Your committee on determining the proper basis for rates and fares in answer to your instructions "to work out a theoretical basis for determining fares on properties having annual gross earnings (operating revenues) of from $100,000 to $5,000,000, considering each $100,000 of earnings from $100,000 to $1,000,000 and each $250,000 of earnings from $1,000,000 to $5,000,000, taking into account particularly the factors of mileage, population, character of construction, providing for all operating expenses, taxes, fixed charges, depreciation and suitable return on investment, based on a twenty-year franchise, and also on an unlimited franchise," begs to submit herewith a detailed memorandum by each of the three members of its sub-committee showing

First, the hypothetical treatment of the problem presented;

Second, the actual figures of existing street railways, and

Third, a general treatise of the fare subject in the four metropolitan cities, New York, Chicago, Philadelphia and Boston, which, although somewhat outside of the scope of the question, deals with some important features of the fare situation.

We recommend that these memoranda be printed and circulated among the members of the association so that full discussion may be had at the midwinter meeting, at which time a plan will be submitted by the committee looking to carrying forward this work by all members of the association.

This committee, from a further study and as shown in these memoranda, has been confirmed in the conclusions of its previous report in that the street railway business as conducted in this country is "selling goods below cost."

It notes with interest the decision of the United States government to establish a zone system in connection with the parcels post which begins operation next Jan. 1. In a business such as that of electric railways where approximately 33 1/3 per cent to 40 per cent of the traffic is handled within three to five hours out of the twenty-four, this representing practically the lowest load factor of any public utility, and where the cost of living and consequent wages paid are increasing by leaps and bounds, it is essential that the present 5-cent fare be limited in distance, and for the street railways of $5,000,000 annual gross earnings and less, as outlined in your instructions, it is apparent that the length of ride should not be over 4 miles.

A THEORETICAL BASIS FOR DETERMINING FARES ON PROPERTIES HAVING ANNUAL GROSS EARNINGS OF FROM $100,000 TO $5,000,000

BY C. N. DUFFY, VICE-PRESIDENT THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY, MILWAUKEE, WIS.

ANNUAL GROSS EARNINGS (OPERATING REVENUES)

Annual gross earnings (operating revenues) of overhead trolley, surface electric railways (city and suburban) vary from approximately one-fourth to one-sixth of their investment, depending upon differences in conditions previously referred to. Certain factors may be used to determine what they should be for given properties. Some of these factors and their varying quantities, for properties having annual gross earnings (operating revenues) of from $100,000 to $5,000,000, are shown by the following approximate figures:

(a) Population served. From 25,000 to 500,000.

(b) Average rides per capita of population served per annum. From 80 to 300, and on some properties they may be in excess of 300.

(c) Miles of single track operated. From 12.5 miles to 250 miles.

(d) Population served per mile of single track operated. From 2000 to 3000, or sometimes more.

(e) Average maximum number of cars operated per mile of single track. From one to three. The average speed schedule for city service is approximately 8.50 m.p.h., varying from approximately 7.5 m.p.h. to approximately 9.5 m.p.h.

(f) Average car hours per car per day. From ten to twelve for the average maximum number of cars operated per day.

(g) Car miles per mile of single track operated per annum. From 40,000 to 100,000.

(h) Car miles per annum per capita of population served. From 20 to 50.

(i) Car miles per annum per revenue passenger. From 0.25 to 0.125.

TRAFFIC FACTORS

(a) Average length of passenger haul.

This can be determined by taking a traffic count on all lines for twenty-four hours of a given day, selected to represent average conditions. Traffic counts should be made at least annually, to ascertain what changes may have taken place in traffic conditions with respect to the shifting of the population, changes in the riding habit of the people and the probable effect resulting therefrom in the use of different lines, as these are factors which will affect the average length of passenger haul and the composite use of all lines. The average length of passenger haul varies from, say, 2 miles, to say, 3½ miles, according to traffic conditions.

(b) Composite use of all lines.

This is determined by the following formula: Total number of passengers carried on each line, multiplied by the total length of the respective lines, divided by the total number of passengers carried on all lines. The following table is an example:

Line.	Length, Miles.	Passengers.	Passenger Miles.
1	3.00	1,000,000	3,000,000
2	4.00	2,000,000	8,000,000
3	0.50	500,000	250,000
Total		3,500,000	11,250,000

Composite use of all lines is 3.21 miles.

The composite use of all lines will probably vary from, say, 50 per cent to, say, 100 per cent more than the average length of passenger haul.

(c) Average length of all lines.

The average length of all lines will probably approximate from, say, 33 1/3 per cent to, say, 50 per cent more than the composite use of all lines. The figures in Milwaukee show approximately 43 per cent, 5.95 miles as compared with 4.17 miles. This information with respect to other properties would be valuable and should be obtained by the committee.

COST OF PROVIDING THE SERVICE

(a) Operating expenses (exclusive of depreciation, contingencies and taxes) of overhead trolley, surface, electric railways (city and suburban) vary from approximately 55 per cent to 65 per cent of operating revenues, dependent upon differences in conditions of operation, but may be assumed to be within an approximation of the following bases:

(1) Way and structures; 5 per cent of gross earnings (operating revenues).

(2) Equipment; 5 per cent of gross earnings (operating revenues).

(3) Traffic; included in "other expenses of operation of cars."

(4) Superintendence of transportation; included in "other expenses of operation of cars."

(5) Power (operation of power plants and substations —excluding "maintenance" but including "superintendent of power") may be taken at from, say, 2 cents to, say, 3 cents per car mile.

(6) Wages of conductors and motormen; should be based on different speed schedules from, say, 7.50 to, say, 9.50 car miles per hour; rate of wages may be taken at from, say, 44 cents to, say, 70 cents, per car hour.

(7) Other expenses of operation of cars (including "traffic" and "superintendent of transportation" exclusive of "superintendent of power") should be treated as an added overhead expense to "wages of conductors and motormen" and may be taken at from, say, 25 per cent to, say, 50 per cent of same.

(8) General and miscellaneous may be taken as approximately 5 per cent of gross earnings (operating revenues).

(9) Injuries and damages may be taken at from, say, 3 per cent to, say, 7 per cent of gross earnings (operating revenues).

(10) Other undisturbed accounts (exclusive of injuries and damages) may be taken as approximately 2 per cent of gross earnings (operating revenues).

(b) Taxes should be taken (as a minimum) on the basis of a tax rate of 1½ per cent on an assessment of 100 per cent of total cost of property.

(c) Depreciation should be based on a composite life of approximately sixteen and two-thirds years for all of the physical property subject to depreciation, except depreciation or appreciation of land (to be treated as an item of "going cost"), including depreciation due to the ravages of time and the effects of the elements, wear and tear incident to use, obsolescence, supersession and public requirement. A composite life of sixteen and two-thirds years for all of the physical property is based on maintenance expenditures (chargeable in operating expenses) for its upkeep equivalent to 10 per cent of the gross earnings (operating revenues). Depreciation should be figured on a 2 per cent sinking fund basis (equal to approximately 82.30 per cent of straight line basis).

(d) Return on investment. Investment may be computed on a basis of from four to six times the annual gross earnings (operating revenues). In some cases the investment may exceed six times the annual gross earnings (operating revenues). Return on investment should be figured on a basis of not less than 8 per cent of total cost of property.

The total cost of property should include:

(1) "Cost of physical property," including 25 per cent for overhead charges as a minimum, to be added to the bare cost of the physical property.

(2) "Going cost" (cost of placing the business on a paying basis), made up of the difference between the gross earnings (operating revenues) derived from the operation of the property and the cost of operating same, said cost including operating expenses, taxes, depreciation, return on investment, contingencies (extraordinary) and amortization (for properties operating on limited termed franchises), together with interest on deficits from operation, figured cumulatively, plus depreciation on land, if any (exclusive of building and improvements), or minus appreciation on land, if any (exclusive of buildings and improvements). The cost of land varies from, say, 5 per cent to, say, 15 per cent of total cost of property.

"Going cost" should be figured at a minimum of, say, 25 per cent of "cost of physical property." It should be understood that the foregoing covers only the ordinary items which go to make up "going cost" and does not include the loss of investment in horse car lines, cable lines or other property appertaining to same superseded or rendered obsolete by electric lines and making valueless the investment made in the lines so superseded or rendered obsolete.

The total cost of property should be worked out on a unit basis per mile of single track, which will vary from, say, $32,000 as a minimum to $100,000.

(e) Contingencies (extraordinary) may be taken as the equivalent of 1 per cent of gross earnings (operating revenues). This is intended to cover losses which may be sustained because of extraordinary casualties of such a nature as are not otherwise provided for, such as earthquakes, floods, cyclones, etc., strikes, riots, or other uncurrent or extraordinary expenses properly chargeable against operation, not otherwise provided for.

(f) Amortization must be taken into account on properties operating on limited franchises. Whether it would be necessary to amortize 50 per cent, 75 per cent or 100 per cent of the investment of a given property operating on a limited term franchise depends entirely on specific conditions which cannot be even theoretically estimated in dollars and cents. Amortization should be figured on a 3 per cent sinking fund basis (equal to approximately 74.43 per cent of straight line basis).

RESULTS OF OPERATION—THE HYPOTHETICAL ELECTRIC RAILWAY COMPANY

Taking into consideration the factors previously referred to, namely, (1) annual gross earnings (operating revenues); (2) traffic factors; (3) cost of providing the service, it would appear that before attempting "to work out a theoretical basis for determining fares," the cost of performing the service should be first ascertained and then worked out for certain units of operation, preferably per car mile, per passenger, per passenger mile and per passenger route mile, in order to determine how far a passenger can be carried for a given rate of fare, or, to put it in another way, how much should be charged for a ride either (1) on a flat rate of fare basis, as is customary in the United States, or (2) on a passenger mile basis, the basis used in Europe.

A tabulation of this has been worked out on these bases for the Hypothetical Electric Railway Company. The service furnished is presumed to be reasonably adequate, based on what are assumed to be average traffic conditions with specific traffic factors applied, as to maximum average

length of passenger haul, composite use of all lines and average length of all lines. In addition, the following specific bases were applied:

(1) Population served per mile of single track, taken as 2000.

(2) Maximum average length of passenger haul, taken as 3 miles.

(3) Composite use of all lines, taken as 4.50 miles.

(4) Average length of all lines, taken as 6 miles.

(5) Flat rate of fare with free transfers, taken as 5 cents.

(6) Rate of fare per passenger mile, taken as 1 2/3 cents.

(7) Rate of fare per passenger route mile, taken as 1.11 cents.

(8) Investment per dollar of annual operating revenues, taken as $4, $5 and $6.

(9) Cost of providing the service (exclusive of return on investment and amortization). Based on the following:

(a) Operating expenses (exclusive of depreciation, contingencies and taxes), 65 per cent of operating revenues.

(b) Depreciation, 15 per cent of operating revenues, based on a composite life of sixteen and two-third years for all of the physical property subject to depreciation, land excluded, assumed to be 5 per cent of investment, figured on 80 per cent of 95 per cent of total investment, on a 2 per cent sinking fund basis.

(c) Contingencies (extraordinary), 1 per cent of operating revenues.

(d) Taxes, 6 per cent of operating revenues.

The total of a, b, c and d is 87 per cent.

(10) Financial results.

TABLE I.—SHOWING PERCENTAGE RETURN ON INVESTMENT AND FLAT RATE OF FARE WITH FREE TRANSFERS NECESSARY TO PRODUCE A PER CENT ON RETURN.

	Based on an Investment of $4 per Dollar of Annual Operating Revenues, Per Cent.	Based on an Investment of $5 per Dollar of Annual Operating Revenues, Per Cent.	Based on an Investment of $6 per Dollar of Annual Operating Revenues, Per Cent.
Percentage return on investment (exclusive of amortization):			
(a) Based on operating expenses being 65 per cent of operating revenues..	3.25	1.55	.42
(b) Based on operating expenses being 60 per cent of operating revenues..	4.50	2.55	1.25
(c) Based on operating expenses being 55 per cent of operating revenues..	5.75	3.55	2.08
Flat rate of fare with free transfers necessary to produce 8 per cent return on investment:			
(a) Based on operating expenses being 65 per cent of operating revenues..	*Cents.* 5.95	*Cents.* 6.61	*Cents.* 7.28
(b) Based on operating expenses being 60 per cent of operating revenues..	5.70	6.36	7.03
(c) Based on operating expenses being 55 per cent of operating revenues..	5.45	6.11	6.78

CONCLUSIONS AND RECOMMENDATIONS

From the foregoing it would appear, if the different factors and differences in conditions previously laid down are taken into account and applied, that a practical basis for determining rates and fares can be worked out and that the basis should be the cost per passenger mile or the cost per passenger route mile. The use of this basis would mean a zone system of fares, or at least the application of the principles of a zone system of fares.

On existing city systems where the rate of fare, free transfer privilege and length of haul are established, in many instances, in accordance with franchise requirements, it would be difficult to apply the zone system of fares, especially with respect to the free transfer privilege. If necessary to increase the rate of fare on city systems, as it is undoubtedly necessary on most of the properties now in operation, any of the methods suggested by the committee in its previous report could be made to meet the situation.

As to extensions of existing city fare limits, sometimes required by municipalities when outlying territory is annexed to cities, or the rate of charge for a second fare to existing outlying districts, the zone system of fares should be applied. The preferable method would be a division of the territory beyond the single-fare limits into fare zones, for which there would be made a charge for a ride in each zone.

The establishment of a zone system of fares as herein suggested would appear to be in line with sound business principles and good public policy, should aid in the development of outlying territory, warrant the extension of lines, remove the barriers that apparently now exist as between the city and the suburbs, and, at the same time, solve the problems involved in a practicable and satisfactory way both to the public and the railways.

The cost of providing urban and suburban electric railway transportation is largely dependent on and more or less directly proportional to the distance passengers are carried. Sooner or later an economic limit to this distance must be reached, beyond which passengers cannot be carried on rates of fare wholly inadequate for the service performed.

TABLE II.—PERCENTAGE OF COST OF PROVIDING THE SERVICE TO OPERATING REVENUES AND TO INVESTMENT—PERCENTAGE RETURN ON INVESTMENT (EXCLUSIVE OF AMORTIZATION).

Based on an Investment of $4 per $1 of Annual Operating Revenues.

	(a) Based on operating expenses being 65 per cent of operating revenues.		(b) Based on operating expenses being 60 per cent of operating revenues.		(c) Based on operating expenses being 55 per cent of operating revenues.	
	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.
Operating expenses..	65.00	16.25	60.00	15.00	55.00	13.75
Depreciation	15.00	3.75	15.00	3.75	15.00	3.75
Contingencies (extraordinary)	1.00	.25	1.00	.25	1.00	.25
Taxes	6.00	1.50	6.00	1.50	6.00	1.50
Return on investment	13.00	3.25	18.00	4.50	23.00	5.75
	100.00	25.00	100.00	25.00	100.00	25.00

TABLE III.—PERCENTAGE OF COST OF PROVIDING THE SERVICE TO OPERATING REVENUES AND TO INVESTMENT—PERCENTAGE RETURN ON INVESTMENT (EXCLUSIVE OF AMORTIZATION).

Based on an Investment of $5 per $1 of Annual Operating Revenues.

	(a) Based on operating expenses being 65 per cent of operating revenues.		(b) Based on operating expenses being 60 per cent of operating revenues.		(c) Based on operating expenses being 55 per cent of operating revenues.	
	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.
Operating expenses..	65.00	13.00	60.00	12.00	55.00	11.00
Depreciation	18.75	3.75	18.75	3.75	18.75	3.75
Contingencies (extraordinary)	1.00	.20	1.00	.20	1.00	.20
Taxes	7.50	1.50	7.50	1.50	7.50	1.50
Return on investment	7.75	1.55	12.75	2.55	17.75	3.55
	100.00	20.00	100.00	20.00	100.00	20.00

In order that this committee may carry on the work assigned to it, to the end that the association will establish "a standard basis for rates and fares" for electric railways operating city systems and suburban systems in conjunction with city systems, and that the application of such a standard basis may be made practicable and uniform, to be applied and used by the properties represented in the association membership, the following recommendations are made as a means to that end:

(1) That the association formulate a standard method for making traffic counts and determining the average length of passenger haul, which will be economical as to application and practical as to results, and that suitable forms be prepared for this purpose, with proper instructions governing their use.

(2) That the association recommend to its company members that traffic counts be made at least annually and that the results of such traffic counts be sent to the secretary of the association for the use of this committee.

(3) That the association appoint a committee on "determining the cost of carrying passengers on electric railways (city and suburban)" to take into consideration the different factors and differences in conditions, including earning capacity with reference to population served; the riding habit of different communities; the miles of track operated; the character of the service furnished; the speed of cars; traffic factors with respect to average length of passenger haul, composite use of all lines, average length of all lines; costs with respect to operating expenses, taxes, depreciation, return on investment, covering total cost of property, including proper allowances for overhead charges added to the bare cost of the physical property, as well as going cost, representing deficits from operation, plus interest figured cumulatively, plus depreciation on land or minus appreciation on land, contingencies (extraordinary) and amortization.

(4) That the association, after approving the finding of the committee on "determining the cost of carrying passengers on electric railways (city and suburban)," set its official seal of approval on same and make it the standard for all of the electric railways represented in the membership of the association, as has been done with respect to other standards of the association.

The results obtained by putting the foregoing recommendations into effect should be turned over to this committee for use in connection with such "practical basis for determining rates and fares" as the association would establish as standard, so that the committee could work out "the cost of providing service."

Table IV.—Percentage of Cost of Providing the Service to Operating Revenues and to Investment—Percentage Return on Investment (Exclusive of Amortization).

Based on an Investment of $6 per $1 of Annual Operating Revenues.

	(a) Based on operating expenses being 65 per cent of operating revenues.		(b) Based on operating expenses being 60 per cent of operating revenues.		(c) Based on operating expenses being 55 per cent of operating revenues.	
	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.	Per cent of operating revenues.	Per cent of investment.
Operating expenses..	65.00	10.83	60.00	10.00	55.00	9.17
Depreciation	22.50	3.75	22.50	3.75	22.50	3.75
Contingencies (extraordinary)	1.00	.17	1.00	.17	1.00	.17
Taxes	9.00	1.50	9.00	1.50	9.00	1.50
Return on investment.	2.50	.42	7.50	1.25	12.50	2.08
	100.00	16.67	100.00	16.67	100.00	16.67

Table V.—Flat Rate of Fare with Free Transfers, Necessary to Produce 8 Per Cent Return on Investment (Exclusive of Amortization).

Investment based on four, five and six times the annual operating revenes.	(a) Flat rate of fare necessary with operating expenses based on 65 per cent of operating revenues.	(b) Flat rate of fare necessary with operating expenses based on 60 per cent of operating revenues.	(c) Flat rate of fare necessary with operating expenses based on 55 per cent of operating revenues.
	Cents.	Cents.	Cents.
Investment based on four times annual operating revenues	5.95	5.70	5.45
Investment based on five times annual operating revenues	6.61	6.36	6.11
Investment based on six times annual operating revenues	7.28	7.02	6.78

ACTUAL FIGURES OF EXISTING STREET RAILWAYS

BY H. G. BRADLEE, PRESIDENT STONE & WEBSTER MANAGEMENT ASSOCIATION, BOSTON, MASS.

In the 1911 report of our committee on rates and fares we idicated that it is possible to figure accurately the distance which overhead trolley surface street railway cars may be operated with profit for a 5-cent fare provided four factors with reference to a company's business are known, and we included in our report certain curves by which such calculations can be readily made. The four items which we mentioned are as follows:

(1) The total cost per car mile of operating expenses, taxes, depreciation and obsolescence.

(2) The average number of 5-cent fare passengers carried per half round trip.

(3) The investment made in the company's property for each $1 of gross business.

(4) The percentage return on the company's investment which must be earned to attract capital freely to the business.

Since our last year's report was completed I have endeavored to secure information from street railway systems covering the above items. In securing this information I have modified the items somewhat by transferring taxes, depreciation and obsolescence from the first item to the fourth. The first item, therefore, covers the total cost per car mile of operating expenses, exclusive of taxes, depreciation and obsolescence. The fourth item covers the percentage return on the company's investment which must be earned to provide for taxes, depreciation and obsolescence and to attract capital freely to the business.

THE TOTAL COST PER CAR MILE OF OPERATING EXPENSES

Operating expenses per car mile for companies from which the other data could also be secured are as shown in the second column of the table on page 1108.

These figures indicate that operating expenses per car mile are not materially affected by the mere size of the road. In general the small companies may be said to have slightly lower operating expenses per car mile than the large companies, but some of the large companies operate on a very low basis and some of the small companies operate on a high basis. If these companies were retabulated with reference to their geographical location, it would appear that the companies in the southeastern section of the country in general operate at a lower cost per car mile than those in the north section or those in the extreme west section.

THE AVERAGE NUMBER OF 5-CENT FARE PASSENGERS PER HALF ROUND TRIP

From the figures shown in the third column in the table on page 1108 it appears that the larger companies carry a greater number of passengers per half round trip than the smaller companies. The reason for this is evident. In the

larger cities it is possible to a certain extent to vary the number of cars operated on each line from hour to hour so that the number of cars operating at any one time is approximately proportioned to the amount of traffic. In smaller cities this is usually impracticable because a line which can handle its rush-hour business on a ten or fifteen minute headway cannot ordinarily reduce this headway during hours of light travel without strong objections from the traveling public. As a result, the cars traveling with very light loads during a large part of the day necessarily reduce the average number of passengers carried per half trip. As shown by the figures this reduction is very marked in some of the smaller cities.

If we consider the larger cities only, it appears that twenty-five 5-cent fare passengers per half trip is about as high as any road can hope to average. That we are not likely to exceed this number of passengers with the present type of car is quite evident when we consider that this figure is the average number of paying passengers per half trip covering the entire day's operation, including hours of light travel, as well as those of heavy travel, and that it does not include transfer passengers, who must also be accommodated on the cars.

Based upon the assumption that twenty-five 5-cent fare passengers is the maximum which we can hope to carry on an average per half trip, it is evident that our maximum receipts per half trip will be $1.25, and this is the limiting factor in determining the distance which the car may be profitably operated.

INVESTMENT MADE IN THE COMPANY'S PROPERTY FOR EACH DOLLAR OF GROSS BUSINESS

The word "investment," as used here, is intended to cover all costs incident to the production or replacement of a property and its business.

The figures obtained showing the ratio between investment and gross earnings are shown in the first column of the table on page 1108.

These figures must, necessarily, be considered approximate because they are in all cases obtained from appraisals made after the completion of the property and at a time when the actual cost of construction was not available. There is always room for an honest difference of opinion as to the cost of replacement of an existing property, and no two engineers making such an appraisal would arrive at exactly the same result.

All of these figures are, however, based on appraisals made by competent engineers of long experience and I think may be accepted as approximately correct. The appraisals of companies (a), (b) and (h) of companies having receipts of over $1,000,000 were made at a time when these properties were not properly equipped to handle their full gross business and give really adequate and first-class service.

The valuations in these cases are, therefore, low and had the physical properties been adequate for the business handled, I think that investment per dollar of gross would have undoubtedly been as high as $4 in each case. Taking the average of all of the companies given in this table, I find an average investment of $3.92 per dollar of gross earnings.

It would appear from the figures that the average investment per dollar of gross is practically the same in smaller companies as in the larger. It is, of course, true that the average investment per mile is much greater in large cities than in small. It is also true that the gross earnings per mile of track are much greater in large cities than in small and these two factors, apparently, offset each other when comparisons are made between the total investment and the total gross earnings.

In considering these figures, it should be borne in mind that in many of the larger cities of the country the investment per dollar of gross earnings materially exceeds the figures given in the table.

THE PERCENTAGE RETURN ON THE COMPANY'S INVESTMENT WHICH MUST BE EARNED TO PROVIDE FOR TAXES, DEPRECIATION, OBSOLESCENCE AND TO ATTRACT CAPITAL FREELY TO THE BUSINESS

It is hardly practical to obtain definite data for this fourth item, but I think it may be possible to arrive at figures which we will all agree are reasonable.

In the matter of depreciation and obsolescence, testimony is available in many court cases and in hearings before public service commissioners giving the opinions and experience of engineers and operators who have had practical experience in the care of street railway properties. The opinions of these men differ as to details, but I think we shall not be far wrong in assuming that they will agree fairly well that at least 3 per cent of the investment over and above ordinary maintenance charges should be set aside to provide for replacement of property due to depreciation, obsolescence and other causes.

I think that 1½ per cent of the value of the physical property may be said fairly to represent the average amount paid in taxes.

The return on the company's investment which must be earned to attract capital freely to the business is not so easy to determine. The return necessary for this purpose, no doubt, varies in different sections of the country. In the older communities, where conditions are considered more stable, an investment would, no doubt, be freely made for a lower return than would be expected in the newer and more rapidly growing sections of the West. In the State of Massachusetts the stocks of domestic street railway companies are non-taxable, and the business of the company is very largely protected by laws, which have reduced its menaces and hazards. Under these circumstances investors are satisfied with a lower return than they would expect in other states.

Considering average conditions throughout the country, however, it does not seem to me that we will be far wrong if we assume that a street railway company should be able to earn 8 per cent on its investment, if it is to secure freely the capital necessary to develop its business. It might be well to point out in this connection that the securing of new capital is, in this country, an exceedingly important part of the business of a street railway company. The cities throughout the United States are growing at an exceedingly rapid rate, and new capital must be continuously obtained if the community is to be properly served.

In a group of companies scattered all over the country with which I am familiar the investment required has doubled on the average once in about seven years.

We have then a total of at least 12½ per cent on the company's investment which should be earned to provide for taxes, depreciation and obsolescence and to attract capital freely to the business.

THE MAXIMUM LENGTH OF HALF TRIP IN MILES FOR PROFITABLE OPERATION

Taking the above figures and applying them as indicated in our 1911 report, we arrive at the figures shown in the fourth column in the table as the maximum length of half trip in miles for profitable operation.

These figures indicate that passengers may be profitably carried a longer distance in the large cities for a 5-cent fare than in the small cities. This is due to the fact that in the large cities the number of passengers carried per half trip, and consequently the receipts per half trip, are greater than in the small cities. It would appear, however, that even in the large cities a distance of from 3½ to 4 miles for a 5-cent fare is the maximum length of half trip for profitable operation, if we assume, as above, that at least 12½ per cent should be earned to provide for taxes, depreciation and obsolescence and a reasonable return on the capital invested.

As a matter of fact, there are, of course, a considerable number of the larger cities in which the length of half trip would average over 3½ to 4 miles, and it is evident that in

the cities where this condition exists the companies are either operating under exceptionally favorable conditions as to investment or low operating expenses per car mile, or they are not earning 8 per cent on their investment after setting aside 3 per cent for depreciation and obsolescence. The real truth is that there are very few street railways in the country which are to-day earning 8 per cent on their investment and setting aside 3 per cent on their investment for depreciation and obsolescence, after paying all operating expenses and taxes.

It is because of this fact that our committee has been appointed to consider the question of a reasonable basis of fare. It is because of this fact that in recent street railway conventions the one question which has overshadowed all others is the financial problem; the question of how the

Table Showing Investment, Operating Expenses, Etc., for Twenty Selected Electric Railways.

Annual gross receipts more than $1,000,000.

Company.	Dollars invested per dollar of gross.	Cents op. exp. per car mile.	Passengers per half round trip 5-cent fare.	Max. length half trips in miles for profitable operation.
a	$3.15	14.96	22.40	4.54
b	3.25	18.33	22.80	3.69
c	4.40	18.50	25.40	3.09
d	4.00	19.60	24.40	3.11
e	3.30	16.30	17.00	3.06
f	3.90	19.00	15.60	2.10
g	5.55	19.90	22.20	1.71
h	3.03	14.22	17.50	3.82
i	4.97	15.00	27.00	3.40
Annual gross receipts more than $750,000 and less than $1,000,000.				
a	$3.00	18.40	13.20	2.24
Annual gross receipts more than $500,000 and less than $750,000.				
a	$3.90	18.30	14.40	2.02
b	3.00	12.60	13.00	3.22
Annual gross receipts more than $250,000 and less than $500,000.				
a	$3.80	18.60	15.30	2.16
b	4.40	12.00	13.40	2.51
c	4.20	13.70	8.70	1.51
d	4.40	13.70	7.40	1.21
Annual gross receipts less than $250,000.				
a	$3.70	17.70	19.00	2.88
b	4.50	15.20	17.00	2.44
c	3.70	14.80	12.60	2.28
d	4.20	12.70	6.60	1.23

street railways, facing continually higher cost of materials and labor and greater length of haul for 5 cents, are to earn a sufficient net return to attract new capital necessary to carry on their business.

The figures derived as shown above would seem to indicate quite clearly that urban street railway lines exceeding 4 miles in length must be a burden on the company rather than a source of profit if operated for a 5-cent fare. It would also appear that an additional charge over and above the present 5-cent fare should be made on all lengths of haul exceeding 4 miles. To bring this change about is a far more difficult problem than to point out its necessity, but it is a real problem which the street railways of the country are bound to face and is one in which the American Electric Railway Association can be of great help through carrying on a proper campaign of publicity.

PASSENGER RATES AND FARES IN CITIES WITH SURFACE STREET RAILWAYS AND ELEVATED RAILROADS OR SUBWAYS

BY FRANK R. FORD, FORD, BACON & DAVIS, NEW YORK, N. Y.

The following memorandum relates to passenger rates and fares within the metropolitan area of American cities having both surface street railways and rapid transit systems of elevated railroads or subways. There are four of such cities, New York, Chicago, Philadelphia and Boston.

METROPOLITAN AREAS

The metropolitan area of these cities has been assumed as that embraced within a circle of 16 miles radius, the center of which is located at the City Hall, thus including 804 sq. miles or 514,820 acres.

The 1910 United States Census shows a population for these metropolitan areas of approximately the following:

New York	6,198,440
Chicago	2,339,090
Philadelphia	1,940,833
Boston	1,572,079
Total of four cities	12,050,442

The magnitude of the electric railway interests of these four metropolitan cities is apparent when it is realized that they contain approximately one-third of the total population of urban localities of 8000 inhabitants or more in the United States. and they represent a capitalization of approximately $1,250,000,000 with gross revenue of over $200,000,000, equivalent to considerably more than one-third of all the electric railways of the United States.

The urban and suburban passenger traffic of these cities is transported almost entirely by three systems: (a) surface electric railways, (b) rapid transit systems of subway or elevated railroads, (c) steam railroads (in some cases electrified).

In New York City the rapid transit systems of elevated and subway lines carry the largest proportion of urban passengers of any American city, this for Greater New York in 1910 being 768,122,000 passengers as compared with 763,140,000 on the electric surface lines, or about 50 per cent of the total. In Philadelphia, where the proportion of subway and elevated railroad mileage is the smallest of these four cities, approximately 8 per cent of the electric railway passengers in 1910 traveled on the subway and elevated line, and 92 per cent on the surface railways.

The proportionate passenger traffic handled by the steam railroads is small as compared with the electric railways. In Philadelphia, for instance, where steam suburban railroads are noted as being among the best of any American city and where other rapid transit facilities are limited, the total passengers carried for one day in 1910 were less than 6 per cent of the passengers carried by the local electric railway system.

FARE LIMITS OF ELECTRIC SURFACE LINES

New York.

In metropolitan New York the surface electric lines are divided geographically by the rivers into one principal system for Brooklyn, two for Manhattan and the Bronx and one for New Jersey, with a few smaller independent companies on the outskirts. The rates of fare have been determined largely by the original franchises, which were based on early political boundaries. The 5-cent rate of fare for Manhattan Borough gives a maximum ride of 13.41 miles from the City Hall to the northern limit. Similarly the 5-cent rate from the Manhattan side of the East River bridges carries to practically any part of the built-up district of Brooklyn and Queens.

In the borough of the Bronx, the next 5-cent zone, making a 10-cent limit from the City Hall, extends beyond the 16-mile circle, and this is also the case for the central part of Long Island, although on its north and south shores the limits of the circle run from 15 cents to 20 cents from the City Hall. In Staten Island (Richmond Borough) and in New Jersey, due to the disconnected location of the various communities, the 16-mile circle practically coincides with the 20-cent limit if 5 cents for the Hudson River tunnel fare be included.

Thus the maximum ride to the edge of the metropolitan district varies from 0.6 cent per mile in Greater New York to 1¼ cents in New Jersey. In other words, to the north and east of the City Hall, where the traffic is densest and the municipal boundaries most extended, the rate per mile is approximately one-half the rate to the west.

Chicago.

In Chicago the traction settlement of 1907 imposed a 5-cent fare to the city limits on lines of the two large street railway systems. This limit is approximately 10 miles to the south, west and north of the business center, giving a maximum ride at approximately ½ cent per mile.

Beyond this limit the next 5-cent zone or 10-cent limit from the City Hall carries a passenger from 3 to 5 miles further. The 15-cent limit approximately coincides with the 16-mile circle, giving a maximum ride at an average of about 1 cent per mile, this, however, representing an average of 2 cents per mile for the two outside zones as compared with ½ cent for the inner zone. The electric lines outside of the inner 5-cent fare limit in some cases are operated in connection with the city surface railways and in others with the city elevated system.

Philadelphia.

In Philadelphia practically all of the street railways within the city limits are operated by one company at the 5-cent rate, and in New Jersey the electric lines are also consolidated into one system. The 5-cent zone extends approximately 5 miles to the west of the City Hall and 10 miles to the north, giving a maximum ride from the center equivalent to 1 cent per mile westwardly and ½ cent northwardly.

Outside of the 5-cent limit, with few exceptions, the suburban trolley systems are independent. The second 5-cent zone, making a 10-cent fare limit from the City Hall, extends from 8 to 11 miles from the center on the west, from 12 to 14 miles on the north, and in New Jersey (exclusive of ferry fare) from 6 to 8 miles out. The 15-cent fare limit on the west extends from 10 to 13 miles from the City Hall, and on the north practically coincides with the 16-mile circle, while in New Jersey it extends from 8 to 14 miles from the center. The 20-cent limit on the west varies from 13 to 16 miles and in New Jersey extends from 10 miles out to the 16-mile circle, although in places this circle overlaps the 25-cent limit both to the west and in New Jersey. Consequently, maximum fares within the 16-mile circle vary from 15 to 25 cents, or approximately from 1 to 1½ cents per mile.

Boston.

The electric transportation system of Boston has been developed along somewhat different lines from those followed in the other cities, in that the subway and elevated lines are operated jointly with and as an integral part of the surface system. The rapid transit lines transport by wholesale passengers from the center of the city to transfer distribution points in the nearby suburbs. Here free transfer is made to the surface lines in terminal stations without the use of tickets. It is consequently impracticable for statistical purposes to separate the rapid transit and surface systems of Boston. The electric transportation business is principally conducted by two systems, one in the central portion of the metropolitan area, the other in the surrounding suburbs. There are also one other considerable suburban system and two additional interurban lines.

The 5-cent fare limit extends from about 5 to 9 miles from the center of the city, giving an average rate of 0.7 cent per mile for this maximum distance. The 10-cent limit extends from about 8½ to nearly 14 miles from the center, producing an average rate of about 0.9 cent per mile for this total distance. The 15-cent limit extends from about 13 to 16 miles from the center, producing an average rate of about 1 cent per mile for the total distance.

The 10-cent limit of the electric roads practically marks the limit of the daily travel, which corresponds with the commutation travel of the steam roads. Beyond this 10-cent limit, nearly all of the regular traffic is handled by the steam railroads. This limitation to the area of electric travel is due to the lack of a real rapid transit system extending any great distance from the center of the city, the time taken by the surface cars being too great to attract the regular traffic.

In all four cities the central business and residential districts comprise a zone of 5-cent cash fares. Transfers are practically universal, although in Philadelphia 3 cents is charged for exchange tickets (a form of transfer) and in Boston the same charge is made for transfer to the lines of an independent system. Upon some of the suburban lines around Boston a 6-cent fare is charged.

FARE LIMITS OF RAPID TRANSIT LINES

In these metropolitan cities, upon the street surfaces of the business districts becoming overcrowded and with the extension of the residential areas, rapid transit lines of elevated or subway railroads have been established, these usually being comprised within the limits of the central 5-cent fare zone of the surface railways.

New York.

In New York City the 5-cent fare limit of the elevated and subway system of Manhattan and the Bronx, under municipal ownership and control, has been extended beyond the 5-cent limit of the surface system, overlapping this to the north for a space of approximately 4 miles. This system has also extended into Brooklyn, forming a 5-cent fare limit encroaching upon the 5-cent fare zone of the Brooklyn surface system. The rapid transit lines in Brooklyn, under the same ownership as the Brooklyn surface system, have approximately the same 5-cent fare limits and charge a second 5-cent fare to Coney Island.

To the north the rapid transit fare limit gives a ride of about 14 miles from the center, or slightly more than 1/3 cent per mile, while in Brooklyn the 5-cent rapid transit limit extends about 8 miles, or a rate for the maximum ride of about 0.6 cent per mile.

To the west the Hudson tunnel system charges a 5-cent rate for a distance of about 3 miles, equivalent to about 1 2/3 cents per mile.

As extended to Newark, the fare on this line is 17 cents for about 9 miles, or approximately 2 cents per mile. This is probably the highest rate of fare charged by any rapid transit system in these metropolitan areas, although it is stated that the total net income barely covers the interest upon its bonds, representing the large investment caused by its expensive submarine tunnel construction. Another interesting feature of this operation is that for the entire distance above ground this line operates over the main line tracks of the Pennsylvania Railroad. The sixty-trip monthly commutation rate on this line to Newark is at the average rate of 1.06 cent per mile.

Chicago.

In Chicago upon the rapid transit elevated system the 5-cent rate obtains to the terminals of all lines, or to the city limits. This 5-cent rate on the south extends for a distance of about 8 miles and on the west and north for about 9 miles, giving an average rate for the maximum distance of about 0.6 cent per mile. Where this rapid transit line extends beyond the city limits to the north the 10-cent fare limit extends about 13 miles from the center, making the cost of the maximum ride about ¾ cent per mile. To the west an interurban electric line connects with the elevated line, charging three 5-cent fares for the 6 miles to the 16-mile circle, or approximately 2½ cents per mile.

Philadelphia.

In Philadelphia the rapid transit system comprises only 7½ miles of a subway and elevated line running east and west approximately 5 miles westwardly from the center, so that the maximum ride from the center is at the rate of approximately 1 cent per mile.

Boston.

As previously stated, in Boston the rapid transit and surface systems are operated jointly. Radiating from the center is a combined elevated and subway line extending to the north about 2½ miles to Charlestown and about 5 miles to Forest Hills on the south. There is also a combined tunnel and bridge line to Cambridge.

FARE RATES OF STEAM RAILROAD SUBURBAN LINES

In general the steam railroad suburban service represents an endeavor to carry the suburban and commutation traffic with trunk line facilities and equipment, although, gradually, the electrification of these steam lines tends to bring

this service more in line with that of the rapid transit urban systems.

New York.

In New York City the steam railroad suburban service begins at what may be termed a distribution district, having for its boundaries the Manhattan Borough water front to Forty-second Street on the north, this including the new Pennsylvania and Long Island Railroad Terminal at Thirty-second Street. Owing to the long additional ride on the steam railroad lines, either through the built-up portion of Manhattan and Brooklyn or through the water and marsh areas to the south and west, the steam railroad rates, compared with other cities, have a large initial differential, and this practically eliminates any 5-cent zone. There are nine principal steam railroad systems doing a suburban passenger business.

The principal classes of rates charged for suburban service are as follows: (a) single fare, (b) regular excursion or round trip, (c) ten-trip, (d) fifty-trip family, (e) sixty-trip monthly commutation.

There are also other tickets of small use, such as school tickets, workingmen's tickets, twenty-trip tickets and yearly tickets. The sixty-trip commutation tickets allow for two rides per day for a thirty-day month. As they are non-transferable, their average use is probably not over fifty trips per month. All of the following figures, however, are based upon sixty trips per month, so that the rates shown are somewhat lower than what actually obtain.

As described by the testimony in the recent case of the Erie Railroad before the Interstate Commerce Commission, the present method of arriving at the sixty-trip commutation rate is as follows:

"Up to 9 miles there is a minimum charge of $5.50 per single trip monthly ticket ..... From 9 miles the fares are based on a rate of 1 cent per mile per trip, decreasing 1 per cent for each quarter of a mile up to a distance of 20 miles, and beyond that decreasing at the rate of 1 per cent each half mile until a minimum of 5 mills per mile is reached ....."

These rates produced increases over the previous rates charged, which increases occasioned the controversy. The fifty-trip ticket fares, it was stated, are based on a rate of 2 cents per mile, less 20 per cent, equivalent to 1.6 cents per mile. The single fare and regular excursion rates are based on from 2½ cents to 2 cents per mile, varying by 5-cent zones and also somewhat from average rates due to short line mileage, competitive factors, fractions of miles, etc.

In the testimony it was shown that on the commutation business for the year to June 30, 1909, including ferriage and ferry mileage, the total revenue per passenger mile between New York and stations in New Jersey averaged, on the combined Erie lines, 0.63 cent on sixty-trip commutation tickets, 1.44 cents on fifty-trip family tickets, 1.68 cents on ten-trip tickets, 2.25 cents on one-way tickets. Even at the increased rates this railroad maintains that the traffic is not of equal profit with its other business.

The basis of sixty-trip monthly commutation rates on some other railroads, it is understood, is to make a terminal charge per trip of from 5 to 6 cents with a charge for mileage of from ¼ to 1/3 cent.

Based on commutation rates, the 10-cent zone for this suburban steam railroad travel in Greater New York extends from 9 to 12 miles to the north, about 8 miles to the east, and from 10 to 14 miles to the west and south of the distribution district. The 16-mile circle on the north, west and south averages a 12-cent rate and on the east a 15-cent rate. The maximum ride of 16 miles is therefore at an average rate of from 2/3 cent to nearly 1 cent per mile. On the other hand, if we take half the regular excursion or round trip rates to the 16-mile circle either in New York or the other three cities, we find the average rate is about 2 cents per mile.

Chicago.

In Chicago the railroad terminals are all close to the delivery center. There are fifteen principal steam railroad systems doing a suburban passenger business. The same classes of tickets are used as in New York, except that instead of the fifty-trip family ticket there is a twenty-five-trip ticket.

The 10-cent fare zone at commutation rates varies from 10 to 18 miles, so that the average of the 16-mile circle is 11.2 cents, or an average of about 2/3 cent per mile.

Philadelphia.

In Philadelphia there are two principal and one smaller steam railroad system doing a suburban passenger business, with terminals practically at the center of the delivery district. Owing to lack of other rapid transit facilities, this steam railroad suburban service has been highly developed.

Practically the same classes of tickets are used as in the other cities named. One-way rates are apparently based on a charge of 2½ cents per mile, and regular excursion rates on a charge of 2 cents per mile, the ten-trip tickets being about 10 per cent less than the regular excursion rate.

The 10-cent zone of commutation rates almost exactly coincides with a 10-mile circle, showing an average rate for the maximum ride of about 1 cent per mile. A 12-cent rate would extend from 11 to 15 miles from the center, whereas the 16-mile circle shows an average of 12.5 cents or approximately 0.7 cent per mile for this maximum ride.

Boston.

In Boston there are three principal steam railroad systems and one narrow-gage line doing a suburban passenger business.

The classes of tickets used are as follows: (a) Single fare (no regular excursion rate), (b) twelve-ride, (c) twenty-five-ride.

The single fare rates are based on an average of 2 cents per mile. The twelve-ride and twenty-five-ride tickets are unlimited and transferable and are the result of legislative enactment. The greater part of the commutation business is handled upon these tickets, the twenty-five-ride tickets being at a slightly less rate than the twelve-ride. These are based on rates from about 0.9 cent to 1¼ cents.

The 10-cent zone of commutation rates based on the twenty-five-ride commutation tickets averages about 10 miles, which, therefore, equals an average of about 1 cent per mile for this distance. The 12-cent zone averages about 12 miles, and the 15-cent zone about 15 miles, while the 20-cent zone averages about 16 miles, which would seem to indicate that the limit of the large suburban business is 15 miles.

It should be borne in mind that in all of these comparisons of distances from the center of the city up to the limits of the 16-mile circle, the rate given is along the radius of the circle, whereas the railroad distance is usually longer than this, due to the roundabout route. In the tabulated statements which follow the rates per mile are based on railroad route distances.

COMPARATIVE RATES OF FARE

In the comparative statements which follow the rates of fare on the principal surface electric and rapid transit lines within the metropolitan area of 16 miles from the City Hall of each of these cities have been averaged for the 5, 10, 15-cent, etc., zones of all routes whose limits fall within this circle. The averages shown are the simple averages of the principal routes for each zone. The actual distance traveled by passengers, and to a less extent by cars, on these routes would be less than the total length of route and would give a correspondingly higher average rate per passenger mile actually traveled. In order to get the true average it would also be necessary to weight each route in proportion to its traffic. The results shown, therefore, should be regarded as merely indicative of general tenden-

cies and of the relation of the various cities and systems.

Surface Electric Railways

Statement No. 1, hereto attached, shows comparative rates per mile of route for a maximum ride through the 5, 10, 15 and 25-cent zones on the surface electric railways of the metropolitan areas of these four cities. The maximum rides for the central 5-cent fare zone are approximately the same in New York and Chicago, producing an average rate of about 0.6 cent per mile. Similarly, Boston and Philadelphia have about the same average length of ride with a rate for the maximum distance of about 0.7 cent per mile. For the 10-cent zone the longest average rides are given in Chicago, while for the 15, 20 and 25-cent zones New York and Boston give about the same length of rides, which are considerably longer than in Philadelphia.

It will be noted that there is a considerable increase in the rate per mile for the zones beyond the central 5-cent zone, this resulting from smaller traffic.

STATEMENT NO. 1.—SURFACE ELECTRIC RAILWAYS, AVERAGE DISTANCES AND RATES FOR VARIOUS FARE ZONES WITHIN 16-MILE CIRCLE FROM CITY HALL.

	5-Cent Zone.			10-Cent Zone.			15-Cent Zone.			20-Cent Zone.			25-Cent Zone.		
City.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.
New York	24	8.57	0.58	22	12.82	0.78	11	15.17	0.99	7	19.11	1.05	5	21.56	1.16
Chicago	28	8.28	0.60	14	14.93	0.67	..	.....	....	..	.....	....	..	.....	....
Philadelphia	16	7.22	0.69	13	11.33	0.88	17	13.25	1.13	9	14.01	1.43	7	16.87	1.48
Boston	20	7.16	0.70	28	11.45	0.87	23	15.18	0.99	17	18.48	1.08	5	22.61	1.11

Note: Ferry mileage and ferriage at 5 cents included.

STATEMENT NO. 2.—RAPID TRANSIT LINES, AVERAGE DISTANCES AND RATES FOR VARIOUS FARE ZONES WITHIN 16-MILE CIRCLE FROM CITY HALL.

	5-Cent Zone.			10-Cent Zone.		
City.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.	Number of Fare Points.	Average Miles of Route from Center.	Rate Per Mile in Cents.
New York	18	8.85	0.56	4	11.50	0.87
Chicago	11	9.30	0.54	1	15.31	0.65
Philadelphia	1	5.11	0.98	..	.....	....
Boston*	..	....	....	..	.....	....

*Boston rapid transit data combined with surface railway data.

Rapid Transit Lines

Statement No. 2 gives a similar comparison of rapid transit routes. In New York the average per mile for the 5-cent zone practically agrees with that for the surface electric railways, although in Chicago the maximum ride is longer and the rate about 10 per cent less than on the surface. For the 10-cent zone the number of fare points is too few to provide a good comparison.

Suburban Steam Railroads

From Statement No. 3 of commutation rates on steam railroads, for the 10 or 12-cent zone it will be noted that the length of ride in Chicago is considerably more than in the other three cities, producing the lowest rate per mile. The average of these commutation rates for the 10-cent zone is higher than the regular cash fares on surface electric railways, although this is contrary to the popular impression. The steam railroad rate of one-half the regular excursion fare as shown on Statement No. 4 is practically double the commutation rates. If these two classes of steam railroad rates with the other miscellaneous classes of tickets are averaged, it will be seen that steam railroad suburban rates are considerably higher than the electric railway rates. From Statement No. 4 it will be seen that the Chicago steam railroad rates are considerably less than those of the other cities.

STATEMENT NO. 3.—SUBURBAN STEAM RAILROADS, AVERAGE DISTANCES FOR VARIOUS FARE ZONES AT COMMUTATION RATES WITHIN 16-MILE CIRCLE FROM CITY HALL.

	10-Cent Zone.			12-Cent Zone.			15-Cent Zone.			20-Cent Zone.		
City.	Number Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number Fare Points.	Miles of Route.	Rate Per Mile in Cents.
New York	26	10.65	0.94	25	15.04	0.80	9	16.50	0.91	..	.....	....
Chicago	17	14.70	0.68	7	19.20	0.63	..	.....	....	..	.....	....
Philadelphia	24	12.19	0.82	14	16.31	0.74	..	.....	....	..	.....	....
Boston	20	10.43	0.96	16	12.19	0.99	19	14.79	1.01	10	16.10	1.24

Note: Ferriage and ferry mileage included.

STATEMENT NO. 4.—SUBURBAN STEAM RAILROADS, AVERAGE DISTANCES FOR VARIOUS FARE ZONES AT ONE-HALF REGULAR EXCURSION RATES WITHIN 16-MILE CIRCLE FROM CITY HALL.

	10-Cent Zone.			15-Cent Zone.			20-Cent Zone.			25-Cent Zone.			30-Cent Zone.		
City.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.
New York	17	5.72	1.75	21	8.12	1.85	24	10.43	1.92	27	12.67	1.97	26	14.47	2.07
Chicago	10	7.54	1.33	13	11.15	1.35	14	13.09	1.53	11	14.33	1.74	6	15.05	1.99
Philadelphia	17	4.90	2.04	22	7.80	1.92	23	10.22	1.96	20	12.60	1.98	19	15.20	1.97
Boston	12	5.58	1.79	15	8.47	1.77	19	11.34	1.76	18	12.81	1.95	11	14.90	2.01

Note: Ferriage and ferry mileage included.

STATEMENT NO. 4.—SUBURBAN STEAM RAILROADS, AVERAGE DISTANCES FOR VARIOUS FARE ZONES AT ONE-HALF REGULAR EXCURSION RATES WITHIN 16-MILE CIRCLE FROM CITY HALL.

	35-Cent Zone.			40-Cent Zone.		
City.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.	Number of Fare Points.	Miles of Route.	Rate Per Mile in Cents.
New York	17	16.26	2.15	12	17.56	2.28
Chicago	5	17.52	2.00	..	.....	....
Philadelphia	14	17.20	2.03	6	18.30	2.19
Boston	8	16.58	2.11	6	18.68	2.14

Note: Ferriage and ferry mileage included.

STATEMENT NO. 5.—SUMMARY, SUBURBAN STEAM RAILROAD RATES OF FARE WITHIN 16-MILE CIRCLE.

	One Half Regular Excursion Fare.		Monthly Commutation Fare.	
City.	Number of Points.	Rate Per Mile of Route (Averaged). Cents.	Number of Points.	Rate Per Mile of Route (Averaged). Cents.
New York	386	2.20	376	0.92
Chicago	204	1.55	186	0.91
Philadelphia	364	2.05	361	1.26
Boston	298	1.82	98	1.10

Note: Ferriage and ferry mileage included.

Statement No. 5 gives the simple arithmetical average of all the suburban steam railroad commutation and excursion fares within the metropolitan area. The commutation rates are the lowest in Chicago and New York, where the distances of travel are greatest. These commutation rates average from about 0.9 cent to 1¼ cents per mile. On the other hand, the regular excursion rates are highest in New York and lowest in Chicago, varying from 2.2 cents to about 1½ cents per mile.

CONCLUSION

From the above considerations it would appear that the greatest tendency toward lower rates in these large cities will arise from the extension of the 5-cent fare zone on

rapid transit lines of elevated or subway railroads. Owing to the enormous expense of construction and equipment, municipal ownership and control is being generally adopted in the financing of these lines. It is recognized that many of these new rapid transit routes will not be self-supporting at the outset, and the aim is to shift the burden to the real estate along the route, or to the public utility company already occupying the field. Upon the popular plea of reducing the rates of the existing surface lines and of extending the real estate development in the outskirts of the city, the tendency is to extend unduly the 5-cent limit on these rapid transit lines. Too little consideration is given to determining rates of fare which will produce a sufficient return upon the new investment and at the same time not affect disastrously the rates charged upon existing lines.

The same policy of unduly extending the rapid transit 5-cent limit would also cut into steam railroad suburban rates and thus convert a business which could be profitably conducted by the rapid transit lines to one whose success is doubtful without municipal assistance.

My recommendation from the above study is that the most careful consideration should be given the subject of rates of fare upon future extensions of rapid transit lines in large cities, from the standpoint both of non-interference with the equilibrium of existing rates and also of the development of the rapid transit lines upon a business basis.

MEETING OF THE AMERICAN RAILWAY ASSOCIATION

The fall session of the American Railway Association was held at the Blackstone Hotel, Chicago, Ill. on Wednesday, Nov. 20, 1912. There were present 180 members, represented by 200 delegates. The executive committee reported an active membership of 349, operating 264,001 miles of railroad, and an associate membership of 124 members, operating 6350 miles.

The committee on transportation presented a report in which it submitted several questions and answers concerning the practice under the standard code of train rules, which were duly approved by the association. The committee also reported progress in the revision of the standard code of train rules and that a complete report on this subject would be made as soon as possible.

The committee on maintenance reported that the tests of steel rails which are being made by M. H. Wickhorst, under the special direction of the rail committee of the American Railway Engineering Association and the auspices of the committee, have been continued but are not yet finished. The committee recommended that the specifications for carbon steel included in Report No. 30 of the American Railway Engineering Association be provisionally approved as the standard of the association. This recommendation was accepted. The committee also presented a report from its sub-committee on standard dimensions of box cars, which was thoroughly discussed, and at the request of the committee referred back to it for further consideration.

The committee on the safe transportation of explosives and other dangerous articles reported that encouraging progress is being made toward the uniform enforcement of the regulations covering these matters.

The committee on electrical working presented a progress report which was published in the last issue of this paper.

The committee on relations between railroads presented an amendment to Per Diem Rule No. 1 providing a penalty of 5 cents a day when per diem is not reported to car owners within six months. The proposed amendment is to be submitted to the members of the association for a vote by letter ballot. The committee presented an amended form of the interchange report blank, Form B-1, to be used in connection with the cut-up forms of interchange blank as approved by the Association of Transportation & Car Accounting Officers. The amended form was adopted by the association.

The committee also presented amended forms of Car Service Rules 10 and 11, which were approved by the association. On the recommendation of the committee a resolution calling for the strict observance of the M. C. B. recommended practice in regard to the marking of cars and the M. C. B. standard location for such marking was adopted.

In connection with Car Service Rule 15, paragraph D, the association also adopted a resolution that railways must publish third-rail clearances in the publication "Railway Line Clearances" before they can claim the right to charge cost of transfer under the rule to the delivering road on cars which cannot pass approved third-rail clearances of the American Railway Association.

The association adopted the committee's recommendation that Section B of Rule No. 1 of the National Car Demurrage Rules be amended to include cars under load, delay to such cars to be regulated by the proper car distribution rules. Interpretation 921, issued by the committee on relations between railroads on Aug. 22, 1912, was withdrawn. A change in Section A of Rule No. 9 of the National Car Demurrage Rules was approved. This withdrew from cars subject to Rule No. 2, Section B, paragraph 5, the credit allowed in Section A1 and changed the last part of the section to read that when a car has accrued five debits the charge provided for by Rule No. 7 will be made for all subsequent detention, including Sundays and holidays.

The committee on relations between railroads reported on the subject of handling cars loaded with company material that it was not desirable to attempt to adopt in detail any standard practice under which the prompt handling of cars loaded with company material might be best accomplished.

The committee, however, had prepared a resolution which was approved by the association to the effect that during periods of car shortage each company should obtain reports to show how promptly it was releasing the revenue equipment used in handling its own material, with the object of expediting the release of such equipment. As a result of the investigation made by the committee it recommended the adoption of uniform sizes for passes by all railroads. This was approved by the association.

Resolutions were adopted to the effect that empty cars being prepared for loading with less than carload freight should be cleaned and that all protruding nails and spikes should be withdrawn or driven in, and also that box cars used for bulk grain loading should be carefully inspected to insure against grain leakage defects and that where advisable to do so burlap or kraft paper for temporary protection against minor grain leakage defects should be used.

The association decided to hold its next meeting in New York City on May 21, 1913.

In a recent discussion of the use of oil fuel it was stated that a number of steam power plants used for reserve or to carry unexpected loads due to accidents or to emergency conditions have been changed to oil-burning plants by placing the burner in the front end of the boiler, the grates being covered with a checkerwork of firebrick giving openings of such proportions as to admit sufficient oxygen for consuming the oil fuel. The gas pilot light is kept burning constantly so that when the boilers are called suddenly into service the oil burner is started by simply opening two operating valves. In such plants hot water is kept constantly passing through the boilers in a way similar to the practice followed in steam fire engine houses.

DECISION OF STRAUS ARBITRATION BOARD

On Nov. 25 the arbitration board selected to consider the wage question of the steam locomotive engineers submitted its report. The board fixed a minimum wage in passenger service of $4.25 per day, and $4.75 for through freight service. The engineers had asked for $4.40 and $4.60 (according to the size of the engines) in passenger service and for as high as $5.75 for freight service. The board consisted of Oscar S. Straus, of New York; Charles R. Van Hise, of Madison, Wis.; Albert Shaw, of New York; Frederick N. Judson, of St. Louis, and Otto M. Eidlitz, former president of the Building Trades Association of New York City. The railroads were represented on this board by Daniel Willard, president of the Baltimore & Ohio Railroad, and the engineers by P. H. Morrissey, former grand master of the Brotherhood of Railroad Trainmen. The report received the unanimous consent of the five members first mentioned. It was signed by Mr. Willard, with an explanatory statement. Mr. Morrissey filed a dissenting opinion.

The practical effect of the decision is that as a general rule the more poorly paid of the engineers receive an increase, while those receiving the higher wages will not be affected to any appreciable extent. While stating that they should not deny an increase of compensation to the engineers on the ground that the roads are unable to pay, the board says "if they are not able to pay such compensation with existing rates there is just cause for them to open again the question of an increase of rates with the Interstate Commerce Commission."

ELECTRIC SERVICE

With reference to electric service, one point on which the railroads laid much stress in the hearings before the board, the decision says: "Since the use of electric locomotives or multiple-unit trains upon steam railways is in so early a stage of development, and there is as yet no approximation to stable conditions, but a wide variation in existing practices, the board found itself unable, from the evidence before it, to make any uniform rules regulating rates of pay and conditions of service for engineers or motormen employed on such trains." In other words, no change is made in existing working rules and conditions, though the minimum day's wage of $4.25 in passenger service is awarded the engineers.

With reference to the right of engineers to man electric service the board says: "Wherever electric service is installed as a substitute for steam, or is now in operation on any of the railroads parties to this arbitration, or on any of the tracks operated or controlled by any of them as part of their system, the locomotive engineers shall have the preference for the positions of engineers or motormen on electric locomotives or multiple-unit trains; but this right of the engineers shall not operate to displace any man operating electric power on any of the railroads parties to the agreement on May 1, 1912."

This decision, containing as it does the words "as part of their system," would seem to uphold the principal contention of the railroads in this matter. The carriers had argued that, while it was their practice to give preference to the locomotive engineers in choosing men for engineers and motormen on electric locomotives or multiple-unit trains, they did not want to be prevented from making any contractual relations from time to time in leasing properties by being obligated to guarantee employment to the engineers who might be employed on the line leased either to or from some other party.

PROPOSED WAGE COMMISSIONS

As far as the public is concerned, by far the most important feature of the board's decision is a recommendation for "the creation of national and state wage commissions or labor commissions, which should exercise functions regarding labor engaged at work in public utilities analogous to those now exercised with regard to capital by the public service commissions already in existence." On this point the board says: "From the viewpoint of the public it is an intolerable situation when any group of men, whether employees or employers, whether large or small, have a power to decide that a great section of the country, as populous as all of France, shall undergo great loss of life, unspeakable suffering and loss of property beyond the power of description through the stoppage of a necessary public service."

That the board considered the general labor proposition presented by the engineers' case of far more importance than the amount of money involved is indicated by its statement that "the amount of money involved, while it is very large, is far less important in the eyes of the board than the public interests."

The board says that it does not hold "that the advance in pay to organized labor has been too frequent or too large, but merely that the question of advance for a given class of labor engaged in work upon the public utilities should not depend upon organization but upon justice. Especially for the public utilities is it important that labor should have a just wage, and if the existing wages are not adequate they should be increased. If the increase in wages places the public utilities in a position that does not enable them to secure a fair return upon capital invested and maintain a proper reserve, they should be allowed to increase their rates until they are in that position. In short, the public utilities should not impose an undue burden upon the public by paying higher wages than are reasonable, nor should the public receive services from the railroads at a rate so low that labor does not receive fair compensation and capital its fair return. How important this statement is will be understood when it is appreciated that of the gross earnings of the railroads of the United States as a whole, excluding officials, over 42 per cent goes to labor, and on the fifty-two railroads involved in this controversy over 45 per cent."

"If the arguments above presented are sound," the report continues, "there seems to be no way to obtain justice for the three parties concerned, the railway companies, the railway employees and the public, in the matter of wages except to have a permanent board which shall have the problem of adjustment and maintenance of justice for the three parties continually before it.

"It is believed that if the plan of wage commissions were adopted it is probable that railway employees would not have a just ground for a strike, and this fact, combined with the power of the law and public opinion, would render a strike extremely unlikely in the future."

In concluding, the report says: "Finally, it is the belief of the board that in the last analysis the only solution—unless we are to rely solely upon the restraining power of public opinion—is to qualify the principle of free contract in the railroad service. A strike in the army or navy is mutiny and is universally punished as such. The same principle is applied to seamen because of the public necessity involved. A strike among postal clerks, as among the teachers of our public schools, would be unthinkable. In all these cases the employment, to borrow a legal phrase, is affected with a public use, and this of necessity qualifies the right of free concerted action which exists in private employments.

"However, if the principle be accepted that there are certain classes of service thus affected with a public interest and men who enter them are not free concertedly to quit the service, then these men must be guarded in the matter of wages and conditions by public protection; and this it is believed can best be done through an interstate wage commission.

"It is well understood by the board that the problem for which the above plan is a suggested solution is a complex

and difficult one. The suggestion, however, grows out of a profound conviction that the food and clothing of our people, the industries and the general welfare of the nation cannot be permitted to depend upon the policies and the dictates of any particular group of men, whether employers or employees, nor upon the determination of a group of employers and employees combined. The public utilities of the nation are of such fundamental importance to the whole people that their operation must not be interrupted, and means must be worked out which will guarantee this result."

EXECUTIVE COMMITTEE MEETING OF THE ENGINEERING ASSOCIATION

The executive committee of the American Electric Railway Engineering Association met on Friday, Nov. 22, at the association headquarters, New York City. Martin Schreiber, engineer of maintenance of way Public Service Railway Company and president of the Engineering Association, presided at the meeting. There were present Secretary Donecker, L. P. Crecelius, electrical engineer Cleveland Railway; John Lindall, superintendent rolling stock Boston Elevated Railway; J. H. Hanna, chief engineer Capitol Traction Company; B. F. Wood, assistant engineer Pennsylvania Railroad; E. R. Hill, Pennsylvania Railroad; Norman Litchfield, engineer car equipment Interborough Rapid Transit Company; Paul Winsor, chief engineer motive power Boston Elevated Railway; R. H. Pinkley, engineer of way and structures Milwaukee Electric Railway; F. R. Phillips, superintendent of equipment Pittsburgh Railways; G. W. Palmer, Jr., electrical engineer Bay State Railway, and J. M. Larned, engineer maintenance of way Pittsburgh Railways. President Shreiber announced the following appointments to the chairmanships of the various standing committees of the Engineering Association: Mr. Hanna, engineering accounting; Mr. Wood, power generation; Mr. Hill, heavy electric traction; Mr. Winsor, standards; Mr. Pinkley, buildings and structures; Mr. Phillips, equipment; Mr. Palmer, power distribution, and Mr. Larned, way matters. F. M. Waldron, signal engineer Interborough Rapid Transit Company, was reappointed as chairman of the committee on block signals.

President Schreiber then assigned First Vice-president Crecelius to report upon committee membership, Second Vice-president Lindall to report on publications and Third Vice-president Hanna for the preparation of a tentative budget for the Engineering Association during the next year.

With the object of arriving at some method of avoiding the consideration of any subject at the convention more than once, Secretary Donecker suggested that the report of the committee on standards should be presented in sections, the various sections to be considered upon the different days during the convention that the reports of standing committees upon the same subjects were considered by the convention. A general discussion upon the possibility of such procedure ensued. After consideration of the various phases of the question, it was decided to have the president appoint a committee to report upon a revision of the method of establishment of standards and recommended practices for the Engineering Association, the committee to report before the January meeting of the American Electric Railway Association.

The matter of assigning a sub-committee for consideration of the subject of education of apprentices was then discussed, the value of such an investigation being generally conceded. However, owing to the fact that the subject of education is being considered by the American Association, it was decided to request that such consideration include the matter of engineering apprentices. The question of electrolysis was taken under consideration and, in view of the fact that the American Association had already appointed a committee to consider the subject, President Schreiber was requested to confer with the American Association regarding the scope of the work.

The matter of subjects to be considered by the different standing committees of the Engineering Association was then placed before the executive committee by John Lindall, chairman of the committee on subjects, the other members of which were Messrs. Hanna and Litchfield. This report was the result of a meeting of the subjects committee at the association headquarters on Nov. 21. It was considered in detail by the executive committee and the following were decided upon as subjects for the various committees during the coming year:

COMMITTEE ON POWER DISTRIBUTION

1. Specifications for overhead crossing of trolley contact wires over railway tracks—to be continued.
2. Specifications for overhead crossings of foreign wires with electric railway wires—to be continued.
3. Concrete, lattice and tubular poles, including settings for iron poles—to be continued.
4. Specifications for various sizes and kinds of wire and cable for the purposes of power distribution.
5. Specifications for trolley wire, No. 00 hard-drawn copper—to be continued in conference with the American Society for Testing Materials.
6. Standard line material and construction—to be continued, with instructions to consider first standard design of overhead d.c. construction.
7. Revision of specifications for overhead crossings of electric light and power transmission lines.

JOINT COMMITTEE ON BLOCK SIGNALS FOR ELECTRIC RAILWAYS

1. The use of continuous track circuits for the control of automatic signals for high-speed interurban service.
2. Recommendations for signaling single-track suburban railways, with headway between five and thirty minutes, speed not exceeding 20 m.p.h.
3. Recommendations for signaling double-track suburban railway, with headway between one and ten minutes, speed not exceeding 30 m.p.h.
4. Recommendations for signaling a single-track interurban railway, with headway not less than one hour, speed 40 to 60 m.p.h.
5. Recommendations for signaling single-track interurban railway, with headway as frequent as fifteen minutes with trains in several sections, speed 40 to 60 m.p.h.
6. Recommendations for signaling double-track interurban railways, with headway as frequent as five minutes and speed 40 to 60 m.p.h.
7. Digest of laws and rulings.
8. Study of installations.

JOINT COMMITTEE ON TRAIN OPERATION

1. Further study of two-car operation for city service.
2. Further study of subject as applied to interurban service.
3. Articulated or multiple-unit car operation for city service.
4. Effect of car design on duration of stops.

COMMITTEE ON BUILDINGS AND STRUCTURES

1. General specifications and form of contract for railway structures—to be continued.
2. Review of modern carhouse construction—to be continued.
3. Fire protection rules.

COMMITTEE ON POWER GENERATION

1. Peak loads.
2. Boiler settings and furnace design.
3. The possibilities of the gas engine.
4. The possibilities of gas producers for (a) anthracite coal and (b) bituminous coal.
5. The best arrangement of automatic relays and apparatus to protect power plants from shut-downs.
6. The application of distant control principles to all important valves in the power plant, with reference to con-

centration of control in some point of the plant remote from the possibility of damage.

JOINT COMMITTEE ON ENGINEERING ACCOUNTING

1. Cost accounting—to be continued.
2. Inter-department charges—to be continued.
3. Should timekeeping be done by the accountants' or engineering department?

JOINT COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY

The work of this committee to be continued.

COMMITTEE ON WAY MATTERS

1. Nine-inch and 7-in. girder grooved and girder guard rails—referred back to standing committee for further consideration.
2. Design for joint plates for 7-in. and 9-in. rails—referred back to standing committee for further consideration.
3. Proper foundation for tracks in paved streets.
4. Alloyed steel rails—to be continued.
5. Specifications for splice bars for girder and high T-rails—to be continued.
6. Use of T-rail in streets—to be continued.
7. Pavement for use in connection with girder and T-rail.
8. Rail fastenings for heavy service.

COMMITTEE ON HEAVY ELECTRIC TRACTION

1. Clearance for automatic train stops—to be continued.
2. Location and clearance of overhead working conductors.
3. Electrolysis of metallic structures—to be tentatively considered, depending upon the result of the conference of President Schreiber with the American Association.

COMMITTEE ON EQUIPMENT

1. Wire and cables for car equipment.
2. Storage battery car operation data.
3. Specifications for solid steel wheels—to be continued.
4. Revision of brakeshoe standards.
5. Standard car wheel measuring tape.
6. Investigation of difference in present existing standards of the American Electric and Central Electric Railway Associations.
7. Air-brake hose specifications.

OTHER SUBJECTS

The subject of open storage yards versus carhouses was also taken under consideration as it was suggested by the committee on subjects. Definite action was, however, postponed. It was also decided by the executive committee that special authority should be vested in the standards commitee to appoint a sub-committee to prepare suggestions as to style in specifications for standard and recommended practices of the association to the end that all specifications should be made up as nearly as possible in the same general form.

The executive committee then adjourned, President Schreiber stating that the membership of the various standing committees would be completed and the lists of names given out in the near future.

In order to prevent splitting and shorts at the ends of the commutator bars, at the same time eliminating the collection of oil and dust at this point, the mechanical department of the People's Railway Company, Dayton, Ohio, has installed an insulating ring on the armature shaft beside the ends of the commutator bars. This insulating ring consists of ½-in. red fiber and a ⅛-in. mica ring next to the bars. This two-ply ring is clamped in position by a brass collar. Stock fiber is purchased for the rings made of this material, but the mica rings are purchased to size. A General Electric 80 motor requires a ring 9½ in. in diameter and the cost of the insulation applied and ready for service is $3.50. After one year's test it has been found that this phase of commutator trouble has been eliminated, and all armatures are being protected with insulating rings as fast as they come into the shop for repairs.

CONVENTION OF THE NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS

In the last issue of the ELECTRIC RAILWAY JOURNAL an account was published of the sessions at Washington on Nov. 19 of the National Association of Railway Commissioners. The sessions were continued by meetings on Nov. 20, 21 and 22.

On Nov. 20 the first report was that of the committee on grade crossings. It gave statistics of the accidents during the past year and the methods followed in different states of dividing the cost between the railroads, the State and the cities and towns. The statistics given included the following in regard to the electric interurban railways of the State of Ohio:

"The total number of fare passengers carried in 1912 was 164,101,056; number of deaths, five, or one in every 32,820,211 carried. The total number of fare passengers carried in 1911 was 155,215,899; number of deaths, thirteen, or one in every 11,939,684 carried. The total number of fare passengers carried in 1910 was 143,932,390; number of deaths, twelve, or one in every 11,994,366 carried."

Upon request, Professor Gray, of the National Civic Federation, outlined the work being undertaken by that association in compiling the laws relating to public service commissions throughout the country, and he requested the co-operation of the commissioners in the matter. He also stated that a model public service bill was to be drafted by a committee in charge of this subject and would be submitted to the commissions for their suggestions.

The election of officers was then held and resulted as follows: O. P. Gothlin, Ohio, president; L. B. Finn, Kentucky, first vice-president; Clifford Thorne, Iowa, second vice-president; W. H. Connelly, Interstate Commerce Commission, secretary, and William Kilpatrick, Illinois, assistant secretary.

COMMITTEE ON RAILROAD TAXES AND VALUATIONS

There was also a discussion on the report of the commission on railroad taxes and plans for ascertaining fair valuation of railroad property. An abstract of this report was published on page 1065 of the last issue of this paper.

Commissioner Thelen, California, referred to the two most frequently used bases for valuation, namely, cost of reproduction new, less depreciation, and original investment, and urged the latter where it was possible to secure the information. The plan of using the cost of reproduction might work well enough, he said, as to those utilities which have but little real estate, such as gas and water companies, and with but little unearned increment, but he believed that in many cases the value of the real estate owned by railroads had increased so much since its purchase that if the cost of reproduction new should be used the rates would steadily go up instead of going down.

Commissioner Maltbie, New York, said that in the valuations conducted by the Public Service Commission of New York, First District, an attempt had been made to determine the investment so far as it could be traced. He considered it a factor which ought not to be made secondary to the valuation of the property as it existed to-day, but it was not always possible to learn the investment, and that was the only reason, he thought, why courts and commissions in the past had attached so much importance to the question of present value; that is, cost to produce new, less depreciation. He also drew a distinction between the fair value of a property for purposes of sale, for purposes of condemnation, for purchase by a municipality and for rate-making purposes. In regard to depreciation, he pointed out that the courts and commissions had always held that companies were entitled to a rate sufficient to provide for depreciation and to keep their capital intact, assuming good management, prudent investment and prudent conduct in the enterprise. Hence the rates should always provide for depreciation, but it was equally necessary to consider appreciation.

SESSION ON NOVEMBER 21

At its meeting on Nov. 21 the association favorably considered certain changes in the constitution, including admission to honorary membership of a committee of three from each steam and electric railway accountants' association. It then decided to hold the next convention Oct. 28, 1913, in Washington. One of the reports of most interest to electric companies presented at this meeting was that of the committee on rails and equipment, of which a digest follows.

BESSEMER VERSUS OPEN-HEARTH RAILS

In the report of the committee on rails and equipment attention was called to the fact that recent rail breakage as compared with the past was to a great extent due to two causes, namely, the gradual exhaustion of pure ores suitable for the Bessemer process, making necessary an increase in the proportion of phosphorus in the finished rail from 0.06 per cent to 0.10 per cent, and the rapid increase in wheel loads and speeds.

In tracing the history of rail failures the report stated that the steel now universally used in rails was primarily a combination of iron and carbon. United with these elements and forming more or less useful functions were manganese and silicon, but in addition there were always found phosphorus, sulphur and other impurities which could not be wholly removed. As phosphorus appeared to be the most dangerous impurity and the Bessemer process did not eliminate it, it was necessary with this process to use ores comparatively free from phosphorus, and the exhaustion of the low-phosphorus ores had in consequence resulted in the fact that steel rails of heavy sections made in the last ten years had not given as good service as rails of lighter sections produced before that time.

Quoting a paper written some time ago upon tire steel tests at the Standard Steel Works, the report in explaining the injurious effects of phosphorus stated that these were due to the segregation of the impurities from the steel itself and defined segregation as the concentration of a number of the elements in a certain portion of the ingot, this concentration taking place in the part of the ingot which solidified last. The elements displaying the greatest tendency toward segregation were carbon, phosphorus and sulphur, while but little variation existed in the case of silicon and manganese.

Quoting from a paper by P. H. Dudley to the American Railway Engineering Association, the report stated that it was obvious that with a metal containing 0.10 per cent of phosphorus the rail might be so sensitive to rapid strains that it would not carry reversals of the same load at 60 m.p.h. that it would carry at 30 m.p.h., such steel not being able to resist the shocks of impact load, although showing 10 to 15 per cent ductility under static loads in the testing machine. It had been shown by recent comparisons that the open-hearth steel had a greater tenacity and toughness to resist wheel effects of high-speed trains than had Bessemer steel containing 0.10 per cent of phosphorus, both rails being used in the same tracks for the same wheel loads and speeds.

In its conclusion as to the causes of rail breakage the committee stated that the increase in the proportion of phosphorus in Bessemer rails from 0.06 to 0.10 per cent was probably one of the main elements which had caused the increased breakages of recent years and that it appeared to be out of the question to secure good material with a higher phosphorus content than 0.10. The result appeared to be that the use of the basic open-hearth process which permitted of the reduction of phosphorus was almost compulsory. As differentiated from the basic process, the acid process was stated to produce somewhat better steel from high-grade raw material, but did not permit of the reduction of phosphorus and therefore required, as did the Bessemer process, the use of ores low in phosphorus. With the basic process it was practicable to limit the phosphorus to 0.04 per cent, and in consequence the committee stated that there appeared to be no reason to question the advantage of open-hearth rails over Bessemer, provided adequate care was used in management of the furnace and the other processes of manufacture. This fact was further indicated because for many years nothing but open-hearth steel had been used in the manufacture of important materials such as boiler plate, car axles, locomotive connecting rods and other parts, Bessemer steel having been long considered unreliable for such uses.

The committee stated that it was probable that a large number of rail failures occurring with Bessemer steel were due to a brittle zone which formed in the upper part of the ingot due to segregations. This was due to the fact that the combination of phosphorus, carbon and sulphur cooled more slowly than the mixture of carbon and iron and therefore formed on the upper side of the ingot a considerable volume of brittle and defective metal. In its conclusions as to methods to be used for the reduction of rail breakages the committee stated among other things that the substitution of basic open-hearth steeel for Bessemer steel was necessary.

SESSION ON NOVEMBER 22

The principal event of interest to electric railway companies at the last session, that on Nov. 22, was the report of the committee on accounts and statistics of electric railways. This report was presented by C. N. Duffy, vice-president Milwaukee Electric Railway & Light Company, who called attention to some of the principal features in the report and the recommendations that the association should take steps toward the preparation of a uniform system of accounts through a committee empowered to confer with the Interstate Commerce Commission and the committee on standard classification of the American Electric Railway Accountants' Association and with other committees of that association and of the Engineering Association. This report was published in the issue of this paper for Nov. 23. The recommendations were adopted. The session then adjourned.

METHOD USED FOR LIGHTING MARKERS ELECTRICALLY

An ingenious scheme for electrically lighting the markers on the Terre Haute, Indianapolis & Eastern Traction Company's interurban cars has been devised by G. R. Denehie, master mechanic. Heretofore the markers were supplied continuously with current from twelve storage batteries which were in series with the lamps; now the batteries furnish the source of energy only when the trolley wheel is off the wire or the current is off the line. The original method of furnishing the current from the batteries was unsatisfactory owing to the number of circuits required and the reduced candle-power in the high-voltage lamps. The revised wiring diagram is shown and consists of a 7-volt storage battery in series with four 110-volt, 16-cp lamps. A relay in the light circuit opens an auxiliary circuit, which consists of four 7-volt, 4-cp lamps connected in parallel. This auxiliary light circuit operates in series with the storage battery when the trolley current is off. One 110-volt lamp and one 7-volt lamp are installed in each marker.

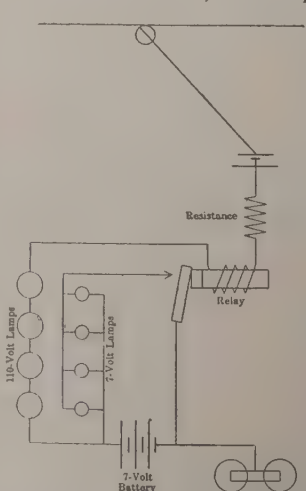


Diagram of Circuit for Electric Markers

Papers at the C. E. R. A. Meeting

Two Important Reports Presented at the Columbus Meeting of the Central Electric Railway Association on Nov. 21—One Is a Report on the Recent Meeting of the International Association for Testing Materials; the Other Embodies Rules for Safety of Employees on High-Tension Lines

A reference to a report submitted at the last meeting of the Central Electric Railway Association by E. H. Dewson, Westinghouse Traction Brake Company, on the sixth congress of the International Association for Testing Materials was published in the account of the proceedings of the Central Electric Railway Association on page 1071 of the last issue of this paper. Mr. Dewson represented the C. E. R. A. at that congress, and the report contains digests of many of the papers presented there. Digests of eight of the papers presented at this congress were published on page 378 of the ELECTRIC RAILWAY JOURNAL for Sept. 7, 1912. Digests of others, as abstracted from Mr. Dewson's report, follow:

THE CONSIDERATION OF THE MAGNETIC AND ELECTRIC PROPERTIES OF MATERIALS IN CONNECTION WITH THEIR MECHANICAL TESTING, BY C. W. BURROWS

The purpose of this paper is to show that certain magnetic and electric tests may be used to supplement or even replace certain mechanical tests. Experiment shows that there is a close relation between the magnetic properties and the presence of flaws, blowholes and strains. The mechanical properties, such as elastic limit, tensile strength and hardness, are within certain limitations functions of the magnetic reluctance and the electric resistance. The possibilities of this method of testing as applied to rails, car axles, etc., are pointed out.

SOUNDNESS IN STEEL RAILS, BY R. W. HUNT

A number of papers were presented suggesting methods of guarding against flaws in steel rails and for detecting such flaws as exist. In one, Robert W. Hunt gives his views on this question in part as follows:

"All steel rails are made from steel ingots; steel ingots are formed by pouring or casting liquid steel into cast-iron ingot molds. The larger the cross-section and the greater the length of the ingots the greater the difficulty in obtaining sound castings, i. e., sound ingots. Without sound and homogeneous ingots it is impossible to produce sound rails, and, unfortunately, the most important unsoundness will be first in the center of the ingot and last in the center of the rails produced from it. The large tonnage in each heat of rail steel, under present practice, necessitates the casting of ingots of large cross-section and long enough to make several rails. The greater the mass of steel and casting the greater the tendency of carbon and phosphorus to segregate at the part of the casting where the metal remains longest liquid, which, under normal conditions, is at the center and toward the top of the mass. This, on account of necessary cooling of the metal from the outside inward, causes a contraction which results in the formation of a cavity or 'pipe,' which defect is increased by hasty casting of the melted steel into ingot molds.

"As the general existing conditions produce ingots with the most undesirable steel in their upper part, it has been and is the practice in manufacturing steel locomotive tires, ordnance forgings, armor plate, large steel shaftings and other of what are termed high-grade products, to reject arbitrarily at least the upper one-third of the ingot. Even this great discard will not always prove an absolute safeguard. In rail purchases it has been found impracticable to secure so great a discard. However, it may be necessary to do this in order to get better rails. It has been found that rails made by the basic open-hearth process are more liable to have interior pipes and segregated spots than steel made from the Bessemer process. This is no doubt due to the fact that larger ingots are used in the open-hearth method."

As to the standard specifications of steel rail, it is the opinion of Mr. Hunt that the chemical requirements remain as they are in most of the specifications. The physical requirements as to finishing temperature are also sufficient, and most of them provide for sufficient drop-testing, but they do not go far enough to give protection against unsound ingots. Practically all specifications require that the test piece shall be broken to expose the interior, and if the interior of the rail shows any defects all of the top or "A" rails of the heat shall be rejected. But each ingot is an individual casting, and that one is sound does not prove that the others, say, four in the Bessemer or twenty-nine in the open-hearth castings, are also good castings. With such variations it follows that the test piece from one ingot would not be representative of the other one. Therefore, it would be necessary to have another test piece cut from the lower end of the "A" rail, and if it also shows unsoundness, then the "B" rail of that ingot shall also be rejected, and so on through each section and in the same manner with each ingot. In this way all the segregated or pipe rails would be eliminated. It has been found that there is a variation in chemical composition of from 0.64 per cent carbon in the mill ladle to 1 per cent of carbon from drillings taken from the center of the web.

Rails with segregated centers do not always fail under the drop-test, and unfortunately it has been demonstrated that rails with such hard centers fail through the softer surrounding metal breaking down and thus producing split heads and often broken rails. Mr. Hunt is fully convinced that until sound ingots are commercially made the safest procedure is arbitrarily to reject the upper part of every ingot for rail rolling and inspect carefully by examining broken test pieces from each section of each individual ingot and thus eliminate the defective rails.

MEANS FOR INCREASING THE STRENGTH OF WOOD PAVING BLOCKS, BY LABORDERE AND ANSTETT

Maintenance and repair of the wood-block pavements in Paris (24 per cent of total street surface) in 1910 cost 1 franc per square meter, against 0.85 franc for stone block, 1.32 francs for asphalt and 2.08 francs for macadam. The average life of the wood block is nine years and on the busiest streets five to six years, mechanical destruction being a great factor. Experiments to find a treatment for increasing the end-grain crushing strength showed that heating at 130 deg. to 140 deg. C., for three to three and a half hours, preferably in heavy coal-tar oil, gave a great increase in strength. This increase disappeared on prolonged immersion in water. Impregnation with pitch has been tried successfully to prevent the entrance of water. Further experiments on this point are in progress.

THE PHYSICAL TESTING OF BROKEN-STONE RAILROAD BALLAST, BY GOLDBECK AND JACKSON

The specifications for broken-stone railroad ballast in use by the various railroads indicate that practically no knowledge of a definite character exists regarding the physical properties of rock with their suitability for use under the track. Most crushed rock is not tested in the laboratory to determine its value for this purpose. If this was done, considerable expense would be saved by a more intelligent selection, and the necessity for opening new quarries and determining the possible suitability by actual trial would be obviated.

The testing of railroad ballast has been done quite extensively in Germany by a method which, briefly stated, is to subject a railroad tie which has been tamped into

place on the stone to be tested to repeated blows of 571 lb. per square inch by means of an eccentric. At the end of each test after the sixth or seventh tamping the stones were dried and screened and the resulting quantities of pulverized ballast measured. It was found by this test that there was a variation in the various kinds of stone used, giving in some cases an amount equivalent to 1.13 quarts from hard porphyry to 4.35 quarts when furnace slag was used as ballast.

The ballast used in railway track construction serves the following purposes: (1) Distributes the load over the roadbed; (2) forms a support for the ties and resists their movement under traffic; (3) provides a means of drainage for the ties; (4) permits of surfacing the track without disturbing the roadbed.

Ballast is subject to disintegration and pulverization from the action of tamping and the traffic loads. The pick used in tamping stone ballast under the ties destroys the stone to some extent. To withstand these actions ballast must have the quality of hardness as well as toughness. By hardness is meant the resistance offered by the rock to the disturbance of its service particles through friction. The toughness measures its resistance to fracture through impact. Ballast should not be dusty, since a dusty ballast causes greatly increased wear on the journals and is likewise unpleasant where passenger traffic is carried. Dust is formed through the grinding up of the ballast under traffic, and the softer and more friable rocks pulverize more readily than the harder and tougher varieties.

The following physical tests are practised at the Office of Public Roads and were applied in the present investigation of rock used for ballast: (1) Hardness, (2) toughness, (3) resistance to wear, (4) cementing value, (5) specific gravity, (6) absorption.

The details and method of obtaining these properties can be obtained by referring to the original article on this subject, into which the report does not go. However, the average results on rough samples are given:

	Hardness.	Toughness.	Cementing Value.	Per Cent. of Wear.
Limestone	14.4	8	54	5.2
Sandstone	15	12	62	5.7
Granite	18.5	12	18	4.5
Trap rock (basalt)	17.3	18	108	2.9

1. Hardness.—Rocks having a coefficient of hardness below 14 are called soft; from 14 to 17, medium; above 17, hard.
2. Toughness.—The results of the toughness test are interpreted so that rocks which run below 13 are called low; from 13 to 19, medium; above 19, high.
3. Resistance to Wear.—Below 8 is called low; from 8 to 13, medium; 14 to 20, high; above 20, very high.
4. Cementing Value.—Values below 10 are called low; from 10 to 25 fair; 26 to 75, good; 76 to 100, very good; above 100, excellent.

Average results on ballast tests obtained from the United States Department of Agriculture, Office of Public Roads, are as follows:

Results in Track.	Kind of Rock.		Results in Track.	Kind of Rock.	
Excellent	Trap,	5	Good or	Limestone,	30
	Limestone,	1	fairly good	Sandstone,	1
Very good	Limestone,	4		Granite,	3
	Sandstone,	1	Poor	Limestone,	2
	Granite,	1		Sandstone,	1
				Granite,	1

It will be noted that the trap rocks because of their toughness and hardness always give good results as ballast material. The limestones are extremely variable in their physical characteristics; some varieties are fairly hard and tough and make good ballast, while others are entirely unsuited for the purpose because of their lack of sufficient hardness and toughness. The granites are likewise variable, and some of them are entirely unfit for use as ballast. The extreme variability in physical properties emphasizes the need for the testing of rock before it is used in the track.

PAINTS FOR METALLIC STRUCTURES, BY CUSHMAN

The efficiency of a paint for metallic structures depends upon (1) the excellence of the vehicle used, (2) the influence of the pigment on the vehicle with which it is mingled, and (3) the influence of the pigment upon the underlying metal. This last phase of the subject, namely, the possible influence of the pigment upon the underlying metal, is the feature of the subject which has received the greatest amount of attention from investigators since the last meeting of the congress. During the last few years a number of independent investigators have attacked the general subject of the corrosion and atmospheric rusting of iron and steel, with the result that the electrolytic explanation of the mechanism of the corrosion reactions has been advanced and successfully defined. As soon as the electrolytic theory appeared it was a natural corollary from this working hypothesis to assume that the pigment particle of a protecting coating might readily have some effect in stimulating or inhibiting the corrosion reactions which were tending to take place upon the surface of the underlying metal.

If it were possible to devise a paint vehicle which would harden under the influence of the oxygen of the atmosphere into a perfect exclusive film into which or through which water could not penetrate, the effect of the pigment mingled with the vehicle would be of little or no importance in any consideration of the subject. It is a well-known fact, however, that no paint film or vehicle as yet discovered or devised has shown perfect excluding power. It may be admitted that the addition of certain high-class gums and other varnish materials will greatly increase the excluding power of the vehicle and also lengthen its life. It must, however, be admitted that the action of moisture and the vapors and gases of the atmosphere will gradually attack and change the nature of even the most expensive and high-grade coatings, while at the same time it must be remembered that the annual and diurnal contractions and expansions of metal are continually tending to disrupt and destroy protective coatings, owing to unequal and changing coefficients of expansion. In the light, therefore, of the most modern investigations it would appear that after everything which is practical and economically possible has been done to improve the paint vehicle the nature of the pigment must have the most careful consideration, as the acceleration or retardation of the rusting processes must depend to a large degree upon the effect of the pigment on the underlying surface.

It is well known that the alkaline earth chromates, as well as some of the metallic chromates which are only very slightly soluble in water, are easily ground with oil to form paste paints which possess excellent spreading and covering values. In fact, the chromate pigments have long been recognized as possessing all of the requisites for making good paints. Many of the chromate pigments, however, are manufactured by the precipitation under acid conditions, and though protective in their own nature, are liable to contain by inclusion rust-stimulating impurities. One pigment which combines a basic value together with the protective effect of a slightly soluble chromate is American vermilion, a basic chromate of lead which, as will be seen later on, has led all the pigments tried on the Atlantic City test panels.

As a result of the water-pigment tests which have been described it was decided to erect at Atlantic City a series of steel panels to be painted with the various pigments ground in a standard vehicle. These tests were under the supervision of committee A-5 of the American Society for Testing Materials and were carried out in a thoroughly practical manner and on a large scale. The results of the official inspection made in June, 1911, are included herewith in the following table. The scale of excellence and durability is given in figures ranging 1 up to 10, this latter figure being the highest rating. A complete history of the Atlantic City steel test panels has recently been published and is available in book form. (H. A. Gardner, "Paint Technology and Tests," McGraw-Hill Book Company.)

In the table are shown the ratings of those panels which were considered by the committee as meriting from 8 to 10 and gave the best all-round service.

A recent inspection of the plates showed that the corroded white lead films have chalked to a considerable extent and show heavy rusting. The zinc films have checked and cracked badly. The sublimed white lead and sublimed blue lead films were in good condition and indicated the value of such basic pigments as protectives of steel. The red lead films, which have given good protection to the metal to which they were applied, showed a slight surface coating of carbonate of lead, due to the action of the carbonic acid of the atmosphere. The iron oxide films were all in very fair condition. The graphite and carbon black paints were pitted in several places with excrescence of rust. The inert pigments, such as barytes, whiting, silica and asbestine, gave very fair service for a short time and then decay progressed quite rapidly in most cases. The plates painted with the chromate pigments were in most excellent condition in nearly every case. This was especially true of the plates painted with zinc chromate, basic lead chromate (American vermilion) and chrome green, the surfaces of these paints not having visibly chalked, checked or disintegrated and freedom from corrosion being shown throughout the test.

TABLE SHOWING ANALYSIS OF AVERAGES, GRADE OF EXCELLENCE FROM 8 TO 10.

Plate.	Pigment.	Average.
34	American vermilion (basis chromate of lead)	10.0
41	Chrome green	9.8
49	Lead and zinc chromate	9.7
39	Zinc chromate	9.5
40	Zinc and barium chromate	9.5
51	Black oxide of iron	9.5
4	Sublimed white lead	9.0
44	Prussian blue I	9.0
5	Sublimed blue lead	8.8
20	Willow charcoal	8.8
222	Composite paint	8.8
45	Prussian blue II	8.5
111	Composite formula	8.5
9	Orange mineral	8.3
10	Red lead	8.3
555	Composite paint	8.2
12	Bright red oxide of iron	8.1
2000	One coat zinc chromate, one coat iron oxide	8.1
14	Venetian red	8.0
888	Composite paint	8.0

One mixture, however, that has shown well under test is composed of heavy blown linseed oil and soya bean oil in equal proportions. In certain cases the addition of China wood oil to linseed oil gives a glossier and harder film, and it has been claimed that the addition of menhaden oil is advisable when the paints are to be exposed under moist and damp conditions, the percentage of stearates present in the marine animal oil acting as a moisture excluder. In this connection Friend has lately stated that the addition of 0.5 per cent of paraffine to a paint oil gives to that oil rather remarkable water-resisting properties. In his tests he prepared a series of films from such an oil and found that their excluding value was 50 per cent higher than the excluding value of films not containing paraffine. As a matter of fact, paraffine, carnauba wax and other water-resisting materials of this type have been used for several years in the United States in the manufacture of paints for the protection of iron and steel.

RULES FOR EMPLOYEES WORKING ON HIGH-TENSION LINES

At the meeting of the Central Electric Railway Association held at Columbus, Ohio, on Nov. 21 a code of rules for the safety of employees in connection with the reconstruction and repair of high-tension transmission lines and alternating-current apparatus was presented by the committee assigned to that subject, consisting of G. K. Jeffries and J. E. Cochran. As stated in last week's issue of the paper, these rules were adopted by the association.

The committee stated that it had found it impossible, on account of the varied conditions existing on different lines, to reconcile the ideas of power superintendents to a standard code of rules to cover these conditions. Therefore, a report was submitted for these rules which gave a general plan of procedure but left optional the detail method of carrying out the general plan.

On many lines physical conditions were such that the instructions and requests should be made between the linemen and the operator in charge of power or substations. On other lines it would be preferable to have the matter handled through the train dispatcher. The proposed rules were so written that either plan might be adopted as standard without deviating from the general plan.

STANDARD RULES FOR THE SAFETY OF LINEMEN

No. 1. Whenever work is to be done on any part of the high-tension line, either during or after business hours, the line foreman or lineman in charge of the work will notify the train dispatcher that he wishes the current cut off and what part of the line will be affected.

No. 1 (optional). Whenever work is to be done on any part of a high-tension line or apparatus connected to it, either during or after business hours, the lineman or inside wireman in charge of the work will notify the power house or substation operator that he wishes a "hold" card placed and the current cut off from that section of line or apparatus on which he desires to work.

No. 2. After receiving such notification, the train dispatcher will at once direct by telephone the operator in charge of power station or substations affected to disconnect and ground the high-tension line and place "hold" cards as required in Rule No. 14. An operator receiving a "hold line" order is expected, under all circumstances, personally to execute such order unless specific authority to delegate the execution to another responsible operator is obtained by him from the person giving the order.

No. 2 (optional). After receiving such notification, the operator in charge of the power house or substation will immediately disconnect high-tension switches controlling the section of line on which current has been ordered off and place "hold" cards on these switches. An operator receiving a "hold line" order is expected, under all circumstances, personally to execute such order unless specific authority to delegate the execution to another responsible operator is obtained by him from the person giving the order.

No. 3. "Hold" cards must be filled out completely so as to indicate their location, the section of the line from which current has been ordered cut off, the person who requested the holding of the line, the operator executing the order and the date and hour the cards were placed.

No. 4. Upon completion of the work, the lineman whose name appears on the "hold" card must personally notify the dispatcher to order the "hold" card removed. The dispatcher will then direct the removal of the card, and if more than one "hold" card has been placed the operator must remove only the card bearing name of lineman as given by dispatcher, and under no circumstances are any of the switches to be closed until each lineman whose name appears on a "hold" card has personally directed the dispatcher to order card removed, and then only must switches be closed and line put into service.

When these cards are removed, the date and hour of such removal and the name of the dispatcher ordering them removed are to be noted on the card. Operator executing the order will sign his name in space provided and then send same to . . . . who will make a complete record of same and keep them in his possession for future reference, reporting to his superior any apparent irregularities or neglect.

No. 4 (optional). Upon completion of the work, the lineman or wireman whose name appears upon the "hold" card must personally notify the operator in charge to remove it, and if more than one "hold" card has been placed the operator must remove only the card bearing the name of man giving the removal order, and under no circumstances are any of the switches to be closed until each lineman or wireman whose name appears on a "hold" card has per-

sonally directed the removal of such card, and then only must switches be closed and line put into service. When these cards are removed, the date and hour of such removal and the signature of the operator removing them and the name of the man ordering their removal must be shown on card and the cards must be sent to . . . . who will check them, making a complete record of same. . . . . will keep these cards in his possession for future reference.

If any neglect or irregularities are apparent, it shall be his duty immediately to make a written report to . . . .

No. 5. No one but the line foreman or lineman or inside wireman in charge of the work, the train dispatcher, the ranking operator at power station and substation operators will give or receive any instructions relative to cutting the high-tension current out or in.

No. 6. The train dispatcher, in giving an order to the operator at power station or substation to cut current off from a certain high-tension line or lines, will state the name of the lineman requesting the line held and what section of the line is wanted.

The operator will write this as received, plainly and without abbreviation, on the "hold" card provided, and when he has finished writing the order he will repeat it to the train dispatcher and give his name. If correct, the dispatcher will give his name and the time, which name and time shall be promptly written on the "hold" card.

No. 6 (optional). A lineman or wireman, in giving an order to the operator at power station or substation to cut current off from a certain high-tension line or lines, will give his name and state what section of line is wanted. The operator will write this as received, plainly and without abbreviation, on the "hold" card provided, and when he has finished writing the order he will repeat it to the man giving the order. If correct, the man giving the order will give his name and the time, which name and time shall be promptly written on the "hold" card.

No. 7. The train dispatcher must keep before him a copy of the "hold" card, on which must be recorded the name of the lineman or linemen, if more than one requested the line held, the stations holding line and the names of the operators receiving the orders and the time of each order.

No. 8. When a lineman desires to work on a section of the high-tension line, or any high-tension apparatus which is already being held for another lineman at some other point, he will notify the dispatcher, who will immediately order additional "hold" cards filled out and placed on control switches in stations affected, as per rules Nos. 1, 2 and 3. In removing this additional "hold" card instructions in Rule No. 4 must be followed.

No. 8 (optional). Where a lineman or wireman desires to work on a section of high-tension line, or any high-tension apparatus which is already being held for another man, he will notify the power house or substation operator, who will immediately place on control switches affected additional "hold" cards filled out and placed in same manner as described in Rules Nos. 1, 2 and 3. In removing this additional "hold" card instructions in Rule No. 4 must be followed.

No. 9. In case of only one high-tension switch opening at either power house or substation, it may be replaced immediately without getting in communication with anyone.

No. 10. In case two or more switches in power station or intermediate substations open automatically on the high-tension line from no apparent cause, notify train dispatcher immediately and wait five minutes before again closing the switches, in order to allow operators in substations affected time to get their station clear of the line as required in Rule No. 13. After a lapse of five minutes, the switches can again be closed and the substations will start up as soon as they get the power. If, however, the switches again open automatically before or after the substations are put back on the line, the train dispatcher will immediately notify the line foreman and will forthwith proceed to make such tests between stations as are necessary to ascertain the location of the trouble. In these tests the line foreman or lineman will work in conjunction with the train dispatcher and the operators in power stations and substations.

No. 10 (optional). In case two or more switches of high-tension line in power station or intermediate substations open from no apparent cause, notify train dispatcher immediately, provided the switches that have been opened be other than switches controlling only the apparatus within station. As soon as the train dispatcher has been notified by operators of all stations affected that they are clear of the line and are ready for the high tension he will order the switches replaced and all substations will start up as soon as they get the power. If, however, the switches again open automatically before or after the substations are put back on the line, the train dispatcher will immediately notify the lineman and will forthwith proceed to make such tests between stations as are necessary to ascertain the location of the trouble. In these tests the line foreman or lineman will work in conjunction with the train dispatcher and the operators in power stations and substations.

No. 11. When the section of line in trouble is located all substations, if any, between the trouble and power station will again start up and remain on the line.

No. 12. When linemen arrive at the trouble they must, before making any repairs, request dispatcher to order "hold" cards placed as required in Rule No. 3, and under no circumstances should they assume that the line is dead. It must be understood that the line is held only for the man whose name appears on "hold" card.

No. 12 (optional). When linemen arrive at the trouble they must, before making any repairs, order "hold" cards placed as required in Rule No. 3, and under no consideration must they assume that the line is dead. It must be understood that the line is held only for the man whose name appears on the "hold" card.

No. 13. In case of an interruption in the high-tension current substation, operators will immediately open the alternating-current and direct-current rotary-converter switches, then notify the train dispatcher that the station is clear of the line; remain close to the telephone so as to answer promptly when called, and prepare to assist in making such tests or repairs as may be necessary. During the time an attempt is being made to put high tension on line substation operator will watch high-tension wiring on the inside of station, to be able to determine if trouble is inside. He should also inspect outside wires where they enter the building.

No. 14. When dispatcher orders "hold" cards placed, as required in Rule No. 3, operators must disconnect the apparatus from the line as follows:

At power stations the high-tension oil switch on outgoing line is to be open and blocked and the air break switches in tower opened, and then a ground connection put on the line side of each of the outgoing wires of the line affected.

At terminal substations the operator shall open the rotary a.c. and d.c. switches, so as to shut down all machines, then open high-tension oil switch and air break switches and place ground connections on each wire on the line side of the air break switches.

At intermediate substations, if the interruption is on the incoming line, then the rules governing terminal substations will apply, with the addition that all the switches controlling the outgoing high-tension line should also be opened.

If the interruption is on the outgoing line, then only the oil switch and air break switches are to be opened and a ground connection put on each wire on the line side of air break switch. *No ground connections are to be made*

without first opening the controlling high-tension switches. As soon as the operators in the stations or each end of the section of the high-tension line on which "hold" cards were ordered placed have properly disconnected and grounded the line called for they will advise the train dispatcher accordingly. The train dispatcher will then notify the lineman.

No. 14 (optional). When "hold" cards are placed as required in Rule No. 3, operators must disconnect the apparatus from the line as follows:

At power stations the high-tension oil switch on outgoing line is to be opened and blocked, the air break switches in tower opened, and then a ground connection put on the line side of each of the outgoing wires of the line affected.

At terminal substations the operator shall open the rotary a.c. and d.c. switches so as to shut down all machines, then open high-tension oil switch and air break switches and place ground connections on each wire on the line side of air break switches.

At intermediate substations, if the interruption is on the incoming line, then the rules governing terminal substations will apply, with the addition that all the switches controlling the outgoing high-tension line should also be opened.

If the interruption is on the outgoing line, then only the oil switch and air break switches are to be opened and a ground connection put on each wire on the line side of air break switch. *No ground connections are to be made without first opening the controlling high-tension switches.* As soon as the operators in the stations on each end of the section of the high-tension line on which "hold" cards were ordered placed have properly disconnected and grounded the line called for they will advise the man giving the order accordingly, which man will remain at the telephone until he is assured by the operator that all of his instructions have been complied with.

No. 15. Before touching any conductor of the high-tension line the lineman will make a careful inspection to see that there is no condition existing that may endanger him in his work; then, before getting closer than 3 ft., throw a chain over circuits each side of the place where the work is to be done and be certain that the chain is in perfect contact with all phases and the chain grounded. The chains should have at least 20 ft. of paraffine rope at each end.

No. 16. *Great care must be exercised in all cases, particularly when two or more crews of men are working on the same apparatus at the same time.*

No. 17. Line foreman or lineman should always, so far as possible, be on the telephone line when dispatcher orders "hold" cards placed or removed, as required in above rules. They should listen to the conversation between train dispatcher and operators and know that the rules are being carried out to the letter, and any infractions should be immediately reported to their immediate superior officer. In all cases of doubt the lineman will consult the operator of power station or substation and in case of further doubt will consult his immediate superior.

No. 17 (optional). Train dispatcher should always, so far as possible, be on the telephone line when linemen or wiremen order "hold" cards placed or removed, as required in above rules. He should listen to the communications between lineman or wireman and operator and know that the rules are being carried out to the letter, and any infraction of the rules should be immediately reported to the superintendent. In all cases of doubt linemen or wiremen will again consult the operator of power station or substation and in case of further doubt will consult their immediate superiors.

No. 18. Employees in telephoning to operators must be brief and accurate.

No. 19. After each serious interruption to service a thorough investigation will be made into the cause and the conduct of each employee in restoring service.

No. 20. Cases may arise where the strict enforcement of the above rules will seriously impede the progress of the work on hand. In such cases linemen may make such temporary modification of these rules as will expedite the work without materially increasing the hazard to workmen or system.

No. 21. No employee shall touch or expose person by dangerous proximity, either with or without rubber gloves, to any switch, current or potential transformer, cable, wire, busbar, or any other apparatus or conductor on which a potential higher than 650 volts exists or may exist, until he has positively ascertained that such apparatus or conductor is disconnected from all sources of such potential. All such high-tension apparatus and conductors of every kind, even if properly insulated, must always be treated and considered as bare high-tension conductors and dangerous.

No. 22 (optional). In cases where company's telephone lines are out of commission, linemen and other employees are instructed to use commercial telephone lines for the purpose of restoring service.

No. 23 (optional). If cars cannot be operated, linemen are authorized to hire whatever conveyance is necessary to take them to the trouble.

No. 24 (optional). It is of grave importance in cases of serious delays that linemen's superior officers be kept posted as to general conditions by any method through which they can be reached.

No. 25. The term "hold card" used in the above instructions signifies a card which is to be placed by the operator after opening up and grounding or short-circuiting the line, as previously described. The display of the card is an assurance to all parties interested that the current is cut off from the section or apparatus indicated.

MERCURY-VAPOR RECTIFIERS FOR LARGE OUTPUT

It is a very remarkable fact that when a glass chamber containing electrodes and some liquid mercury is brought to a suitably high degree of vacuum electricity will pass through the chamber to the mercury as cathode, with only a few volts drop of potential; whereas, in the opposite direction, or from the mercury as anode, electricity can only pass with a drop of potential of hundreds, or even thousands, of volts.

The ordinary mercury-vapor rectifier, with its glass vacuum tube, has a limited current output, owing to the relatively low temperature range within which the apparatus can operate safely. Recently, however, there have been built in Europe some mercury-vapor rectifiers of 100-kw rating and higher. These devices are stated to weigh about 11 lb. per kilowatt of output, or belong to the same order of weight as ordinary transformers. They are constructed of steel and apparently require to be excited electromagnetically so as to distribute the heating regularly. Similar large metallic-case mercury rectifiers have been on trial in the United States for a considerable period, a description of the experimental Cooper Hewitt rectifier of this type having been given in the *Electrical World* for March 23, 1912. It would seem, therefore, well within the scope of possibilities that the synchronous converter and its rotating congeners may disappear from service in the not remote future and be replaced by noiseless mercury-vapor rectifiers of large output.

No doubt, the mercury-vapor rectifier, if made practicable in large sizes, would be better than the converter in substations in the matter of size, weight and first cost. That it would be so likewise in the matter of efficiency is not so obvious. At high voltages the efficiency of the vapor rectifier tends to be very high, since it charges only a few volts, by way of commission. But at 230 volts or less the same actual drop in voltage does not lead to a very high efficiency, whereas the synchronous converter is one of the most highly efficient machines we possess, especially when operated six-phase.

STORAGE BATTERY DISCUSSION BEFORE THE WESTERN SOCIETY OF ENGINEERS OF CHICAGO

At a joint meeting of the Chicago (Ill.) section of the American Institute of Electrical Engineers with the electrical section of the Western Society of Engineers, held in the rooms of the Western Society Nov. 25, J. L. Woodbridge, chief engineer of the Electric Storage Battery Company, presented a paper discussing the "Economic Application of the Storage Battery," and H. H. Smith, electrical engineer Edison Laboratory, presented a description of "The Edison Storage Battery."

Mr. Woodbridge began with a brief description of the fundamental principles of the storage battery, giving numerous applications and methods of regulation. In employing the economical applications of the storage battery, special attention was called to the results obtained in a plant supplying energy to a railway system in a city of 400,000 population. In this particular case the total twenty-four-hour load was 294,000 kw-hr., of which there were two peaks extending above a 42,000-amp line and of short duration. These peaks totaled 5480 kw-hr. above the 42,000-amp line. Assuming that the plant was of sufficient capacity to carry the load up to that point, transferring the balance to a storage battery, the speaker proceeded to show what would be the net saving.

In the first place the load factor would be increased from 42½ per cent to more than 50 per cent. The cost of producing energy up to 42,000 amp would be 0.9 mill per kw-hr., and the additional cost of carrying the temporary load at the peaks would be 5.6 cents per kw-hr., or $308 per day, which is over six times as much as that below the 42,000-amp line. If this amount of energy was stored during off-peak hours it would have cost $55, making a net saving of $253 per day.

The cost of a storage battery installation of sufficient capacity to supply this emergency demand would be $300,000. Figuring maintenance, depreciation, taxes and insurance at 8 per cent, the total cost of the battery energy per annum would be $24,000 plus $20,075, cost of charging the batteries, making a total cost of $44,075 per annum. The total cost of producing the peak load by increasing the size of the units would be $112,420 per annum, which is $67,345 in excess of the battery cost of carrying the peak. This is sufficient evidence to warrant a battery installation under the conditions stated, the speaker said, but there is a point below which there would be no economy, and it is up to the engineer to determine this in any installation.

Other economical applications will be found in outlying districts where a battery may be employed to keep up the line voltage during the rush hours. It is also a valuable asset in stand-by service where the economies resulting are almost impossible to compute. Service continuity is maintained, and just what would result in case the extra load was transferred to another station in an emergency is an unknown quantity. Machines might be so overloaded as to damage them and in some cases result in a destructive fire.

H. H. Smith, of the Edison Storage Battery Company, followed. He described in detail the construction of the Edison storage battery and its application to vehicles and street railway cars. He said this battery was especially adapted to short-time boosts, such as would obtain in car lay-overs, or in the case of electric automobiles recharging could be done during the lunch hour. The life of the battery under different weather conditions was described as well as all detrimental physical conditions that might exist in service, such as impact, short-circuit and heating tests.

In the discussion of the papers which followed the point was brought out that the battery not only serves in emergency loads but may be employed in the purchase of power for street railways, in taking off the peak loads. It also may be employed in reducing the maximum demand when power is purchased. Another point of interest brought out was the relative capacity of the lead storage battery and the Edison storage battery for a given weight. This was found to be 10 watt-hours per pound for the lead and 13 watt-hours per pound for the Edison battery. In reply to a question Mr. Smith said that the Edison battery had not been applied to the central station for taking off the peaks but was doing this by charging storage battery cars during off-peak hours and running them during the rush hours.

THE OUTLOOK FOR INDUSTRIAL PEACE

The issue for November of the *Annals* of the American Academy of Political and Social Science is devoted to "The Outlook for Industrial Peace" and contains fourteen articles in regard to the relation between capital and labor. None of the articles pays especial attention to railways, but Arthur Williams has a communication on the industrial peace activities of the National Electric Light Association, and some of the other writers refer briefly to railroad wage conditions.

One of these is George B. Hugo, president of the Employers' Association of Massachusetts, who discusses the conditions fundamental to industrial peace. It cannot be secured, in his opinion, until both parties realize the importance of individualism and insure its protection at the polls. The author refers to the recent strike of the Boston Elevated Railway, where, he says, the majority of employees at the time of the strike were satisfied with their working conditions, refused to strike and remained loyal to the company. The termination of the strike in Boston, according to the author, established three things: First, that group violence and lawlessness are now recognized as legitimate and effective weapons in industrial disputes; second, that a politically created state board of conciliation and arbitration cannot, by the very nature of its being, render just and impartial decisions in labor disputes; and, third, that government under our present system cannot be relied upon as a compelling force to insure justice and protect the individual and the law-abiding community when corporate capital and organized labor are at war.

Marcus M. Marks gives an account of the recent working of the Canadian disputes act, passed in 1907. This act, which has been discussed in the Electric Railway Journal, was designed to apply primarily to public utilities and hence for the protection of the public, but recourse may be had to it in disputes in private business when both parties consent. One of its chief features is the penalties which are imposed if the labor status of the industry under consideration is interrupted during the investigation of the dispute by the board. During this time workmen who strike or employers who lock out or outsiders who incite either party to do either of these acts are liable to severe punishment. There is no compulsion about the acceptance of the findings of the board, whose duties are only those of investigation. After the findings are rendered either party is entirely free to reject their conclusions, and the employees may strike or the employer may shut down his business or seek to secure other labor. But practically it is very exceptional when the conclusions of the board are not accepted by both sides. Mr. Marks makes some suggestions for improvements in the act should it be considered for American adoption. One is that the board of arbitration should consist of six men instead of three. Experience has shown, he says, that with only three members the single individual who represents a side is under tremendous pressure to "stand up" for his side, right or wrong. His responsibility is unnecessarily great. Again, to have a single judge, or "third man," means that in the end the question is settled according to that single man's judgment or viewpoint. With a board of six, the author

believes that the judgment would be more apt to be fearless and independent and the decision would have a stronger moral influence on both sides and also upon the community.

Arthur Williams, in his article on the industrial peace activities of the National Electric Light Association, points out that the newness of the electrical industry differentiates it from many other organized industries. Many of those holding higher positions have risen from the ranks below, and as a rule those in charge of the plants are direct representatives of the owners, if they are not themselves the owners. That is to say, there is practically no absentee management. Finally, skilled labor is essential, and this calls for a high class of labor. These facts make for good labor conditions. The author quotes from the report of the 1911 committee on public policy in regard to the question of accident compensation, service annuities and profit sharing, and expresses the hope that these policies will become an inherent part of the national industrial life.

DENVER & RIO GRANDE AND OTHER ELECTRIFICATIONS

BY EDWARD P. BURCH, MINNEAPOLIS, MINN.

Many electric traction engineers and many railroad men were intensely interested by the announcement last week of the final decision of the directors of the Denver & Rio Grande Railroad to electrify the railroad system and of an appropriation of $6,000,000 for the work on two sections, each embracing a complete engine stage, one of 115 and the other of 88 miles.

The work on the Denver & Rio Grande Railroad will be the first mountain-grade electrification of a standard-gage, trunk-line steam railroad in America, and the second or third in the world. There are many electrifications at tunnels and terminals which embrace heavy grades, and some interurban railways have exceedingly heavy grades. But these, and such roads as the Leads-Deadwood branch of the Chicago, Burlington & Quincy, the Colorado Springs & Cripple Creek, and the Wilkes-Barre & Hazleton, on which 78 per cent of the 30 miles between the two cities has an average grade of over 2 per cent, are not main-line railroad electrifications with ordinary freight and passenger trains over a common 70-mile to 150-mile engine stage. The electrified division of the Great Northern Railway is only 4 miles long, of which 14,400 ft., or nearly 3 miles is in a tunnel, on a 1.7 per cent grade. The division has never been electrified—in fact the equipment is not adapted for main line work. Electric service is provided for only seven trains each way per day, and the tonnage is only 21 per cent of that at the Baltimore and Ohio tunnel.

In Europe the Italian State Railway has electrified its main-line mountain-grade section, 13 miles long, north of Genoa, and thirty locomotives handle about the heaviest combined freight and passenger service in Europe. There are a few other mountain-grade electrifications in Europe, none of them, however, on main trunk lines. The Valtellina Railway in northern Italy, with 67 route miles, has nine locomotives and ten motor cars, but the service is heavy, branch-line railroad traffic. The St. Polten-Mariazell Railroad on a heavy branch line in Austria has 66 route miles, and seventeen locomotives haul all freight and passenger trains. There are, however, some mountain-grade electrifications already well started, on the Bernese Alps of Loetschberg, on the Western Railway of France and on the Riksgraensen 93-mile road of the Swedish State Railways.

Most of the other railroad electrifications in Europe are not comparable with the above. They handle only heavy passenger service and in most cases will not be financially sucessful until the mixed electric and steam service is abandoned for all-electric service.

The Denver & Rio Grande electrification will embrace several hundred miles of common railroad and include mountain grades over the Rockies. At Soldier's Summit there will be a 2 per cent, 15-mile grade, also a 2.46 per cent, 18-mile grade; and at Tennessee Pass there will be a 3 per cent, 21-mile grade. Freight service is heavy and the climatic conditions are severe.

In the order of their importance, and considering now only railroad electrification in America on main-line roads, for complete passenger and freight service over full engine stages, at the end of 1913 the following showing will be made:

The New Haven electrification will be completed between New York and New Haven; also on one of the most extensive freight switching and classification yards in the country on the Harlem River-New Rochelle branch and on the Boston & Providence four-track main line—in all about 650 miles of electrified single-track road.

The Denver & Rio Grande Railroad will have from 115 miles to 215 miles of electrified track.

The next important electrified railroads in America, in the same class, are now the Piedmont & Northern, 130 route miles; Illinois Traction, 417 route miles; Fort Dodge, Des Moines & Southern, 130 route miles; Northern Electric Railway of California, 116 route miles, and the well-known Spokane & Inland Empire Railroad, with 183 route miles —five roads in which the freight, express and switching revenue tends to equal or exceed the passenger revenue.

Further down the list are the West Jersey & Seashore and similar heavy passenger roads without electric freight service, following which come many short electric freight and passenger railroads and the switching and terminal roads.

Considerable money is being spent on electrification. The Prussian State Railroad administration has ordered 568 locomotives for the complete freight and passenger service on the Berlin Stadtbahn, which will extend many miles out in the country, and a liberal appropriation has been added for the Magdeburg-Leipzig road. The French Western Railway administration has recently ordered 100 electric locomotives.

The New Haven Railroad directors have this year expended about $12,000,000 for electrification. The Boston & Providence Railroad has authorized the expenditure of about $7,000,000. The Butte, Anaconda & Pacific directors have authorized an expenditure of $1,000,000 for the electrification of their short freight and passenger road, but here the heaviest part of the work, on the grades, will still be handled by the steam locomotives. The Denver & Rio Grande Railroad has appropriated $6,000,000 for electrification, and this will require the Utah Utilities Company and the Central Colorado Company to expend equal amounts in increasing their equipment to furnish electrical energy to this road and to other roads in Utah and Colorado which are to be electrified.

Altogether the outlook is good. One of the favorable features in connection with the electrification of several roads is found in two newspaper statements, one by Vice-president Byrnes of the New Haven road, who with reference to the Boston & Providence electrification said: "This is not a compulsory electrification, but is done because it ought to be done to increase the efficiency of the road," and the second by Vice-president Brown of the Denver & Rio Grande, who stated: "Our plans are in the interest of economy in operating expenses."

In the future less argument will be required for steam railway electrification, and the talk about smoke, noise and coal dust will be superseded by considerations of economy and increased capacity.

It is reported at St. Petersburg that the municipality of Canea, in the island of Crete, will offer at auction a concession to construct an electric tramway.

News of Electric Railways

Question of Insuring Continuity of Power Service

At the conclusion of the hearing before the Public Service Commission of the Second District of New York on Nov. 26, 1912, on the order directing the Adirondack Electric Power Corporation and the United Traction Company, Albany, to explain the power failure of Nov. 14, Chairman Stevens announced that the commission intended to issue orders to the end that the United Traction Company should hereafter be provided with a continuous source of power for the operation of its system. Whether or not this could best be accomplished by directing the company to maintain its own steam plants was a question which he said would receive consideration by the commission.

For the United Traction Company, Attorney Lewis E. Carr expressed his willingness to enter into any arrangement which the commission should propose in this respect. He agreed to submit for the commission's approval a proposed amended contract for the securing of power which would prevent the recurrence of the recent service interruption. Mr. Carr traced the history of the stages through which the United Traction Company had gone in securing power for the operation of its system. Years ago he said it was determined that the generation of power at separate steam plants in localities was a very expensive method. He believed that the Adirondack Electric Power Corporation had shown commendable diligence in endeavoring to secure outside power for transmission to the traction company during the recent tie-up in view of the admitted defective condition of some of its transmission lines, some of which conditions existed at the time it took over the property. He described the recent arrangement which the traction company has made whereby the Adirondack company is to have seven boilers at the Mechanicsville plant of the Delaware & Hudson always under steam so that this power can be quickly relayed to the traction system when interruptions occur. This change of power he claimed could be made in fifteen minutes.

Explaining the delay of two hours of the Delaware & Hudson Company's plant at Mechanicsville in getting under way on Nov. 14 to supply the United Traction Company with power, Superintendent R. F. McKinney said the plant carried an ordinary load of 15,000 kw. The call which the United Traction Company made on the Delaware & Hudson Company for power required 12,000 kw additional and necessitated the immediate coaling up of eight boilers.

For the Adirondack Electric Power Corporation, District Manager William H. Blood and Manager W. A. Butterick stated that the officers had been making an exhaustive study of the weak points in its system and had decided that the trouble was occasioned by defective insulators carrying its 30,000-volt transmission lines. These insulators are 18 in. in diameter, and from exterior appearance it is not possible to determine when they become defective and likely to break. The company had just completed the construction of an additional transmission line and has under way another line from its Spier Falls plant. Although not required by its contract with the United Traction Company, it has arranged to pay a considerable sum to the Delaware & Hudson Company to keep the fires banked at the Mechanicsville plant.

Axel Eckstrom, consulting engineer of the Delaware & Hudson Company, said there seemed to be no occasion for having the boilers under steam at the Mechanicsville plant, which entails a cost of about $200 a day. He remarked that if the company had to depend on the steam plants the cheaper method would be "to let the natural resources of New York State go to the dogs and use auxiliary power entirely." Answering the inquiries of persons present, he said that two complete transmission lines had been run rrom the Mechanicsville plant to the United Traction System.

As a result of the accident on Nov. 14 electric railway traffic in five cities, Albany, Troy, Rensselaer, Cohoes and Watervliet, was tied up for nearly three hours during the evening rush hours, and interurban traffic between Albany, Schenectady and Saratoga was also delayed.

Jacksonville Strike

More than fifty of the employees of the Jacksonville (Fla.) Electric Company who went on strike recently have been reinstated by the company. The men returned to work in the same positions and grades which they held previous to the strike, at the new wage scale, and with a clean record as far as merits and demerits are concerned.

The service on all lines in Jacksonville is practically normal. The strike collapsed completely with the return of the men to work, and with it also collapsed the proposed sympathetic strike which the Central Trades & Labor Council had decided to call. In its resolution against calling a general strike the Central Trades & Labor Council said in part:

"The Central Trades & Labor Council, upon request of the striking street car men, decided to call off the contemplated sympathetic strike and to gather funds by assessment and other means for the support of the strikers. The striking street carmen stated that they were sure that the citizens had done what they could to settle the strike and would continue to do so; that the great body of citizens were in sympathy with the boys and that it was only a small handful of city officials and malcontents that had opposed the strikers."

Realizing the hopelessness of continuing the struggle, the strikers on Nov. 20, 1912, took a secret ballot, and reached the decision that efforts to prolong the life of Jacksonville Branch, No. 608, Amalgamated Association of Street Railway Employees of America would be useless. Accordingly, the intention of surrendering the charter of the local union was announced. Subsequently the men adopted a resolution formally declaring the strike to be at an end.

Mayor Magee on Street Railway Matters in Pittsburgh

Mayor William A. Magee of Pittsburgh has addressed to the Council of that city a special message dealing with the communication of James D. Callery, president of the Pittsburgh Railways, sent to the Council under date of Nov. 6, 1912, and referred to at length in the Electric Railway Journal of Nov. 16, 1912, page 1037. The Mayor said in part:

"It would seem to me, from the manner in which this communication from the president of the company has been received, that it is the duty of some one in authority to file a protest and to demand that some action be taken expressive of the real attitude and the real interest of the city in its behalf. Nearly four years ago a survey was begun and various attempts were made in the courts, in the Councils and before the Railroad Commission to learn what the respective rights of the city and the street railway company were, to gain knowledge of the details of the surface railway situation in Pittsburgh upon which some constructive theory of its future treatment could be based. This survey and study has been completed two years. My communication to the Council was dated June 27, 1911. After a period of one month the chairman of Council arranged a meeting with the president of the Philadelphia Company, the second vice-president of the Pittsburgh Railways and one of the counsel of both companies at which demand was made that the city officials meet with all officials of corresponding rank of the Pittsburgh Railways. Such a meeting was brought about Oct. 12, 1911. That meeting was attended by you and me and C. E. Bown, representing the city, and Messrs. Reed, Callery, Smith and Tone, Pittsburgh; Patrick Calhoun, San Francisco, and B. S. Guinness and M. B. Starring, New York, representing the Railways company. At this meeting, by way of opening the discussion, I, at the request of your chairman, made a statement of the city's case against the company and recited substantially the facts and reasons contained in my message to you of four months previously. We were entertained with a roseate picture of the intentions of the Pittsburgh Railways with reference to its future policy.

"After several extensions of time an indefinite postpone-

ment was suggested and tacitly agreed to, and nothing more was heard of the subject until March 20, 1912, nine months after the subject had been submitted to you by me. The communication then received came from one of the subordinates, and informed you that 'in connection with the improvements expected to be carried out by this company during the coming three or four years we desire to submit to you the following details. . . .' The details consisted of the recital of the investment of $5,875,000 in power, carhouse shops, equipment, track reconstruction and repairs. There was nothing said about the expenditure which was to be made in a comprehensive scheme of rehabilitation. There was nothing said about improved service; of experimenting in improved looping and routing; of extending the transfer privileges; of improving the organization and management of the system; of the conditions in relation to compensation, street paving, street repair and street cleaning contained in the old charters and ordinances; nothing was said about reorganizing the corporation on a sound financial basis.

"Not only have the representatives of the company ignored the rights and claims of the city of Pittsburgh during the last year and a half, but the representatives of the city of Pittsburgh itself have designedly or accidentally overlooked them. The policy of investing $2,000,000 per year in the system of the Pittsburgh Railways is no concession to the demands of the city. The company is bound in some manner to keep its property moving. It should not attempt to make a virtue of a necessity. From the point of view of the city and the patrons of the company, these piecemeal improvements really tend to their detriment. An annual deficit in excess of $1,300,000 for two and perhaps the last three years is bound to be continued under the present policy of the management of the company. I cannot look upon these annual deficits with indifference because they are being constantly capitalized and add still further fixed charges. In my humble judgment the City Council should assume the responsibility of considering this question upon its merits from the point of view of the city at large and all its people, no longer expecting it in some inscrutable way to adjust itself."

Findings of Arbitrators at Augusta

In the settlement of the strike of the employees of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., both sides agreed to accept without arbitration certain findings and recommendations of the mediation board representing the citizens of Augusta and to submit to arbitration the question of the reinstatement of twenty-three men and the question of arbitrating the discharge or indefinite suspension of trainmen. The board has found that only thirteen of the men are entitled to be reinstated and that "it is but just and proper that the responsibility for the employment and discharge of the employees must be placed upon the management." The board of arbitration consisted of five members. They reported in part as follows:

"Two propositions were submitted to us for judgment.

"1. Shall the following men: Messrs. Gay, Wilbanks, Bagby, Cauthen, Coursey, Young, Whittle, Salley, Sheppard, Connell, Nichols, McDaniel, Robinson, Cason, Powell, Toole, Ivey, Corbett, Armstrong, Trott, Whitlaw, Connell and Wooley, decreed to be under charges by the mediation board, be restored to their positions with full pay from Oct. 19, 1912, or shall their connection with the company be entirely severed? Against these men certain charges of a specific and general nature were filed. Your arbitrators unanimously agreed that they would not consider themselves a criminal court for the trial of these men on any one or all of these charges, but that after hearing all of the evidence from both parties to the issue they would seek to determine the one question, in the case of each man: Under all the circumstances, is it best for the interests of the public, the carmen and the company that this man remain in the service of the street railway? So it must be distinctly understood that it is our judgment, after careful consideration of all the conditions, that it is for the best interests of all concerned that they leave the employ of the company. Therefore your arbitrators decide that Messrs. Salley, Sheppard, McDaniel, Robinson, Cason, Powell, Toole, Ivey, Corbett, Armstrong, Whitlaw, Connell and Wooley shall be restored to their positions with full pay from Oct. 19, 1912, and that Messrs. Gay, Wilbanks, Bagby, Cauthen, Coursey, Young, Whittle, Connell, Nichols and Trott shall not return to work for the company. While there were differences among the members of the board in regard to the cases of certain individuals, there was such substantial agreement that the report is signed by all of the members of the board.

"2. Shall the discharge or indefinite suspension of trainmen be submitted to arbitration? On that question your board finds as follows: While this board recognizes the wisdom, if not necessity, of arbitration in serious differences arising between the employer and employee, inasmuch as the responsibility for safe and efficient service of a public utility corporation is fixed upon the management, it is but just and proper that the responsibility for the employment and discharge of the employees shall be placed upon the management."

The conditions proposed by the mediation board and agreed to by the company and the men were published in the ELECTRIC RAILWAY JOURNAL of Oct. 26, 1912, page 921.

Home Rule of Public Utilities Demanded in Chicago

Resolutions demanding home rule of public utility corporations were sent to the City Council of Chicago on Nov. 25 by Mayor Harrison. In a letter accompanying the resolutions Mayor Harrison said that he believed they expressed the sentiment of the city of Chicago in regard to the creation of a general public utilities commission so far as the question of having such a commission exercise control of the Chicago public utilities was concerned. This action was taken by the Mayor on account of the hearings which have been held recently by a committee composed of members of the last Legislature of Illinois in reference to the plan to enact a general public utility commission law at the forthcoming session of the Legislature. The resolutions, which were ordered published and were referred to the committee on state legislation with a request for a report at the next meeting of the Council, are in part as follows:

"The people of Chicago are firmly committed to the principle of the broadest measure of local self-government, commonly called 'home rule,' compatible with the proper conduct of the affairs of the sovereign State of Illinois, but more particularly in the control and regulation of those great public utilities mentioned.

"There is no sentiment in Chicago for a change in governmental control of public utilities, but, on the contrary, there now is and has been for some time past a demand that Chicago should have a special charter, with powers therein conferred commensurate with its needs and guaranteeing to it the privileges of 'home rule.'

"Therefore, be it resolved that no law creating a public utilities commission shall be effective in Chicago until it shall have been submitted to and adopted by the legal voters of Chicago."

Report on United Railways, St. Louis

The St. Louis Public Service Commission, which has been investigating the affairs of the United Railways under instructions from the Municipal Assembly, has reported its findings. According to the commission, the company should be permitted to earn dividends on $37,638,667.75, which sum it considers is the actual value of all the properties of the company. The total capital liabilities of the company are $101,380,300. According to the commission, the excess of earnings last year, above a fair return on the company's investment, was $1,069,480.59. This is based on 6 per cent return on the investments which the commission considers were made to supply service to the public. The commission suggests three ways by which the sum which it considers to be in excess over reasonable earnings on the investment could be expended for the benefit of the public. These are:

1. By its absorption in taxes to the city or by profit-sharing with the city.
2. By a reduction in fares.
3. By regulations requiring better service; or it may be

done by a combination of any two or of all three methods.

It is recommended by the commission that the Municipal Assembly enact legislation requiring better service to the public by the operation of more cars. The commission has devised a system of loops in the downtown district which would facilitate traffic in the rush hours. It has tabulated the number of passengers carried on all cars operated by the company at all hours of the day on various lines. Recommendations for the improvements of the service based on these tabulations will be made in the second volume of the report. Among other things the commission says:

"The United Railways, as shown by the earnings and operating expenses, is an exceptionally good property. The management is efficient, the income is assured, and the net earnings are large. The securities in the company, if issued only for the true capital, would be an exceptionally safe investment so far as earning power is concerned.

"If the United Railways had not suffered from a long series of speculative financiering operations, which mistakenly assumed that franchises could be capitalized against the public, and that returns would not eventually be limited to a basis of reasonable return on the investment actually in the service of the public, it is probable that the capitalization of the company would now approximate the amount determined by the commission as the just amount to be earned upon.

"The term of 'innocent investor' is not always suitable to the buyers of 'watered' securities. The laws and rulings of courts are plain notice that fictitious values cannot be recognized in public utility corporations. The investor who, from ignorance of the wrong attempted against the public or from motives of mere speculation, buys 'watered' securities cannot justly expect the public to assume losses which are the result of ignorance or desire for speculative gain. It cannot reasonably be claimed in such a situation that the consequences of the evils created by speculation in franchise values and the hope of exploiting the public should be assumed by the public."

Electrolysis Suit at Allentown.—Alleged damage by electrolysis to its buildings and the machinery installed within them is the basis of a suit which has been brought in the civil courts of Lehigh County, Pa., by the Arbogast & Bastian Company, meat packer, against the Lehigh Valley Transit Company. The action has been brought to recover the sum of $300,000.

Municipal Railroad Recommended in Los Angeles.—The municipal railroad committee of the City Council of Los Angeles, Cal., has recommended to the City Council that Franklin D. Howell, Los Angeles, be employed to draw plans and specifications for a municipal railroad system from the city proper to the harbor, together with complete terminals in Los Angeles and a belt line to the harbor, so that arrangement can be made to submit to the voters of the city in January, 1913, the question of issuing bonds to provide funds to build the road.

Plan to Increase Authority of the Ohio Commission.—Governor-elect Cox of Ohio has asked Commissioner Hughes and W. L. Finley of the Public Service Commission of that State to study the public utility laws of Wisconsin, with a view to recommending amendments to the Ohio law so as to increase the authority of the commission. It has been reported that Edward M. Fullington, who was defeated for re-election for State Auditor on the Republican ticket, may be appointed as a member of the commission by Governor-elect Cox, to succeed O. P. Gothlin, whose term expires in February.

Grade Crossing Elimination in New York State.—The Public Service Commission of the Second District of New York, in its estimate just filed with the State Comptroller for proposed appropriations to be submitted to the Legislature of 1913, has asked for $500,000 for the elimination of level or grade crossings of steam railroads. At the present time there are more than 8000 of these crossings in the territory under the jurisdiction of the commission. During the year about to close no new work has been undertaken in grade crossing elimination because of the failure of the State to make an appropriation this year.

Mayor of Pittsburgh Favors Municipal Subway.—Following a lengthy conference on Nov. 23, 1912, with all the members of the City Council, Mayor W. A. Magee, of Pittsburgh, Pa., declared himself to be in favor of the construction of a subway by the city. The Mayor advocates delay in the matter of the proposals for subways which are before the Council until there could be, if needed, an amendment to the constitution to permit the city to build the subway. He believes that the cost of the subway or part of it should be assessed upon the property which will be directly enhanced in value through the construction of the road.

Plans for Installing Block Signals in Indiana.—At a meeting of the representatives of the interurban railways of Indiana held in Indianapolis on Nov. 16, 1912, and presided over by A. W. Brady, president of the Union Traction Company of Indiana, Anderson, Ind., it was decided to install block signals on all the roads in Indiana included in the recent order of the Railroad Commission of Indiana, referred to in the Electric Railway Journal of Oct. 26, 1912, page 920. M. H. Hovey will be retained by all the roads to advise the companies in regard to carrying out the work. Later the Kokomo, Marion & Western Traction Company was likewise ordered to install 5 miles of block signals and Mr. Hovey was also retained by it in an advisory capacity.

Preparations for Starting Service on San Francisco Municipal Line.—J. W. Riess, vice-president and general manager of the W. L. Holman Company, San Francisco, Cal., which has the contract for forty-three cars for the Geary Street Municipal Railroad, San Francisco, reported to Mayor Rolph of that city on Nov. 15, 1912, that by Dec. 1, 1912, he would deliver ten cars for use on the road and that he would deliver ten more by Feb. 1, 1913. T. A. Cashion, superintendent of the railroad, stated that as soon as he received the first ten cars he would be able to establish service on the line from Thirty-third Avenue to Kearny Street, with a headway of about seven minutes. Commissioner of Public Works Laumeister stated that all the material needed for the lower Market Street extension of the road was virtually on hand and that contracts would be let in about two weeks.

Racine Power Service Interrupted.—At 6:40 a. m. on Nov. 11, 1912, one of the generators used by The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for supplying power for its cars in and about Racine was damaged through a burn-out. The engine driving the generator was shut down and the reserve unit of the same capacity as the damaged machine was cut in on the railway circuits and normal service was established within ten minutes. During the night of Nov. 11-12 a piston ring broke on the reserve engine and this necessitated the shutting down of this engine and generator. Arrangements were at once made with the Chicago & Milwaukee Electric Railway for connections with its power circuit and the Milwaukee and Kenosha power plants of The Milwaukee Electric Railway & Light Company were connected with the Racine lines.

Public Utilities Commission Law Approved by the People of Oregon.—The law creating a public utilities commission for the State of Oregon, which was passed at the last session of the Oregon Legislature, has been approved by popular vote. The question was submitted at the election on Nov. 5 as a result of a referendum petition. The law becomes effective immediately without further formality. The Oregon Public Utility Commission will have supervision over all public utilities except those owned by municipalities. The commissioners are already in office, the law simply clothing the existing State Railway Commission with additional authority. The new bill requires adequate service and reasonable rates, common use of certain facilities and compensation therefor, valuation of properties, uniform accounting and reports. All rates, tolls and charges shown on schedules of tariffs, which are filed with the commission, are not to exceed the rates, tolls and charges in force on Jan. 1, 1911. The commission, in addition to its other powers, is also authorized to conduct investigations, hearings, etc. Appeals from decisions of the commission can be made to the various state circuit courts and from there to the Supreme Court of the State. The commission is also vested with the authority to investigate accidents. The members of the railroad commission, which has been in existence for several years, are C. B. Aitchison, chairman; Thomas K. Campbell and Frank J. Miller.

Financial and Corporate

Stock and Money Markets

Nov. 26, 1912.

Trading on the New York Stock Exchange to-day was greatly restricted. The foreign markets were more active than for some time and the improvement abroad was reflected in the purchase to-day of a moderate amount of American issues for foreign account. The market was also helped by a drop in the call money rate in the afternoon to 3 per cent. The change in the market came after three days of successive declines. Rates in the money market to-day were: Call, 3@12 per cent, with the last loan at 4 per cent; sixty days to four months, 6 per cent; five and six months, 5½@6 per cent.

In the Philadelphia market trading was broad, but the volume of transactions was small. A goodly number of transactions was in the traction issues. There was considerable improvement in the market for bonds.

In the Chicago market the only transactions in the traction issues were in the Chicago Railways issues. The demand for bonds was better to-day.

Trading in the railroad issues at Boston was narrow and dull. There was little demand for bonds.

Trading in Baltimore was dull and restricted to a few issues. The demand for bonds has lessened. The transactions to-day totaled about $35,000.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 20.	Nov. 27.
American Brake Shoe & Foundry (common)	97½	99
American Brake Shoe & Foundry (preferred)	137	138½
American Cities Company (common)	47	47½
American Cities Company (preferred)	81¼	82¼
American Light & Traction Company (common)	434	430
American Light & Traction Company (preferred)	110	108
American Railways Company	42	42
Aurora, Elgin & Chicago Railroad (common)	45	42
Aurora, Elgin & Chicago Railroad (preferred)	89	86
Boston Elevated Railway	121	120
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a75	a75
Boston & Worcester Electric Companies (common)	8½	8½
Boston & Worcester Electric Companies (preferred)	50	50
Brooklyn Rapid Transit Company	90¾	92⅜
Capital Traction Company, Washington	123½	123½
Chicago City Railway	150	150
Chicago Elevated Railways (common)	a30½	a30½
Chicago Elevated Railways (preferred)	89	89
Chicago Railways, ptcptg., ctf. 1	85	85
Chicago Railways, ptcptg., ctf. 2	23	19¼
Chicago Railways, ptcptg., ctf. 3	8	7
Chicago Railways, ptcptg., ctf. 4	2	2¾
Cincinnati Street Railway	126¾	*126¾
Cleveland, Southwestern & Columbus Ry. (common)	6½	6½
Cleveland, Southwestern & Columbus Ry. (preferred)	34	34
Cleveland Railway	106¼	106⅝
Columbus Railway & Light Company	52	52
Columbus Railway (common)	82	82
Columbus Railway (preferred)	90	90
Denver & Northwestern Railway	122	122
Detroit United Railway	80	71¾
General Electric Company	182½	184
Georgia Railway & Electric Company (common)	124	124
Georgia Railway & Electric Company (preferred)	84¼	83¼
Interborough Metropolitan Company (common)	19⅞	19⅝
Interborough Metropolitan Company (preferred)	65¾	65½
International Traction Co., Buffalo, 4% bonds, rcts.	75	75
Kansas City Railway & Light Company (common)	18	18
Kansas City Railway & Light Company (preferred)	40	41
Lake Shore Electric Railway (common)	7	7
Lake Shore Electric Railway (1st preferred)	90	90
Lake Shore Electric Railway (2d preferred)	25½	25½
Manhattan Railway	131	132
Massachusetts Electric Companies (common)	18½	18.
Massachusetts Electric Companies (preferred)	76½	77
Milwaukee Electric Railway & Light Co. (preferred)	100	100
Norfolk Railway & Light Company	27	27
North American Company	83	83
Northern Ohio Light & Traction Company (common)	71¾	71¾
Northern Ohio Light & Traction Company (preferred.	105	105
Philadelphia Company, Pittsburgh (common)	51	50½
Philadelphia Company, Pittsburgh (preferred)	44	44
Philadelphia Rapid Transit Company	25⅝	27¾
Portland Railway, Light & Power Company	66	66
Public Service Corporation	114	114½
Third Avenue Railway, New York	39⅛	37½
Toledo Railway & Light Company	4¾	4¾
Twin City Rapid Transit Co., Minneapolis (common)	104	104¾
Union Traction Company of Indiana (common)	6	*6
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	34	*34
United Rys. & Electric Company (Baltimore)	25½	25⅜
United Rys. Inv. Company (common)	36	37⅜
United Rys. Inv. Company (preferred)	64	65⅜
Virginia Railway & Power Company (common)	52	50
Virginia Railway & Power Company (preferred)	91¼	90½
Washington Ry. & Electric Company (common)	86	85
Washington Ry. & Electric Company (preferred)	88¾	88
West End Street Railway, Boston (common)	*81½	80
West End Street Railway, Boston (preferred)	98	99
Westinghouse Elec. & Mfg. Company	80½	81
Westinghouse Elec. & Mfg. Company (1st preferred)	122	122

*Last sale. aAsked.

ANNUAL REPORT

Spokane & Inland Empire Railroad

The Spokane & Inland Empire Railroad, Spokane, Wash., reports earnings as follows for the year ended June 30, 1912:

	1912.	1911.
Operating revenue:		
Freight	$313,012	$399,981
Passenger	638,620	620,883
Street railway system	545,529	549,110
Other revenue	135,348	115,380
Total	$1,632,509	$1,685,354
Per mile (average)	7,782	8,034
Operating expenses:		
Maintenance, way and structures	$223.561	$277,810
Maintenance, equipment	166,979	185,202
Traffic expense	27,198	27,242
Conducting transportation	505,653	545,399
General expenses	167,412	182,955
Total	$1,090,803	$1,218,608
Per mile (average)	5,200	5,809
Net operating revenue	541,705	466,745
Per mile (average)	2,582	2,225
Taxes accrued	149,000	72,000
Per mile (average)	710	343
Operating income	392,705	394,745
Per mile (average)	1,872	1,881
Deduct:		
Interest on funded debt	$245,168	$247,113
Other interest	195,538	151,255
Accident, Gibbs, Idaho	14,105	36,311
Depreciation, line abandoned; reconstruction, account flood and miscellaneous	8,061	91,766
Total	$462.873	$526,446
Deficit	$70,167	$131,701
Ratio of operating expenses to total operating revenue, per cent.	66.82	72.31
Ratio of taxes to total operating revenue, per cent.	9.12	4.27

J. H. Young, president of the company, says in part in the report:

"The interurban freight business during the past year, in common with all other business in this part of the country, has suffered from the general depression and shows a decrease in the revenue received from transportation of $86,968, or 21.74 per cent, as compared with last year's figures.

"The interurban passenger business shows an increase of 2.85 per cent over last year. The revenue received from other sources, mainly from the sale of power, shows an increase of 17.31 per cent over last year's figures.

"The total operating revenue for the year was $1,632,509, a decrease of $52,845 in comparison with the previous year.

"The charges for operation show a decrease in every department, a total of $127,805, or 10.49 per cent, under the cost of operating for the previous year. The taxes of the company during the past year were increased in Washington from $65,847 to $126,962. This increase was based on a higher assessed valuation of the company's property, which our attorneys believe to be unjustified. The amount of taxes that would be due, based on the assessed valuation of former years, was tendered and refused by the county officials. The matter is now pending in the courts.

"The power plant of the company at Nine Mile, on the Spokane River, has a maximum capacity of 20,000 hp, with a continuous capacity of 15,000 hp, and is furnishing for the operation of the Inland division from 4000 hp to 5500 hp. The power contract with the Washington Water Power Company, entered into when our lines were first constructed, has three years to run. We are using under this contract 3800 hp, the minimum amount permitted by the contract. This power is used on the Cœur d'Alene and traction divisions. The traction division is also using from 2500 hp to 3000 hp, and the Cœur d'Alene division about 1200 hp, which is furnished by the Nine Mile plant. We are selling about 4500 hp for commercial and irrigation purposes, for which we are receiving an average of $4 per hp per month. The revenue from the sale of commercial power shows an increase of about 30 per cent over last year.

"The company has two high-tension power lines from Nine Mile to Spokane, constructed over its private right-of-way, either of which is capable of carrying the entire output of the plant, thus insuring continuity of service, in case of damage or accident to one of the lines. Practically no extensions were made to the 66,000-volt high-tension

power lines during the past year, the 68 miles now in operation being capable of supplying the present and prospective business for several years.

"The total expenditures for additions and betterments charged to capital account amount to $259,753, as follows:

Additional right-of-way on the Coeur d'Alene division in East Side syndicate addition, Spokane	$40,726
New storehouse building, Spokane	10,500
New stations and waiting rooms	13,081
Equipment	13,412
Traction line extensions and paving in Spokane	132,936
Additional flowage for power plant	42,436
Miscellaneous	6,659

"Notwithstanding the satisfactory decrease in operating expenses for the past year, the physical condition of your property is excellent. Roadbed and structures have been kept in first-class condition, renewals being made where necessary. Spurs and sidings have been put in where business promised in order to build up and enlarge industries upon its lines, and the company is in a condition to handle a large amount of traffic.

"The country through which your lines are operated is developing satisfactorily and is harvesting this year one of the largest crops in its history. Lumber trade is showing a marked improvement.

"Taken in connection with the decreased cost of handling the business, everything points to a favorable showing for the ensuing year."

Bartlesville Gas, Electric & Railway Company, Bartlesville, Okla.—The Bartlesville Gas, Electric & Railway Company has been incorporated in Delaware with an authorized capital stock of $1,000,000 as the successor to the Bartlesville Interurban Railway. The new company will be controlled by the Utilities Improvement Company, New York, N. Y., organized by Henry L. Doherty & Company.

Beaumont (Tex.) Traction Company.—Judge Gordon Russell, of the United States District Court at Beaumont, has entered an order discharging the receiver and dismissing the receivership proceedings in the case of the Interstate Trust & Banking Company, New Orleans, against the Beaumont Traction Company. The receiver is directed to discharge all the duties as receiver not later than Dec. 15. James F. Weed was appointed receiver of the company in 1909 when the City Council took steps to forfeit the company's franchise for alleged failure to comply with the conditions of the grant. Eventually a new franchise was granted the company, one of the terms of which required that the receivership should be dismissed by Nov. 8, 1912. The Council recently extended this time to Dec. 31, 1912. Mr. Weed will continue in charge of the property as general manager.

Central Park, North & East River Railroad, New York, N. Y.—Judge Lacombe in the United States District Court has confirmed the sale of the Central Park, North & East River Railroad to Edward Cornell for $1,673,000. The sum of $116,300 in cash was paid in court, which together with the $50,000 already deposited made up the required 10 per cent of the amount which was needed to secure action by the court.

Chicago, Fox Lake & Lake Geneva Railroad, Chicago, Ill.—F. B. Bronder has been appointed receiver of the Chicago, Fox Lake & Lake Geneva Railroad and the Wisconsin Construction Company by Judge Kavanagh in the Superior Court at Chicago on the application of John Early. The railroad was organized to operate an electric line from the western city limits of Chicago to Lake Geneva.

Decatur Railway & Light Company, Decatur, Ill.—The amount of the outstanding stock of the Decatur Railway & Light Company has been increased from $1,300,000 to $1,375,000.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—The Indianapolis & Cincinnati Light & Power Company has been organized as an auxiliary to the Indianapolis & Cincinnati Traction Company to conduct the light and power business of that company.

Louisville (Ky.) Railway.—At a recent meeting of the directors of the Louisville Railway a special committee of directors, composed of Charles T. Ballard, Samuel Casseday and L. W. Botts, was appointed to investigate the question of increasing the annual dividend upon the company's common stock from 4 per cent to 5 per cent. The complete report to the directorate has been withheld from the public, but the conclusion was reached that, although the gross revenue of the company has increased materially, the net income did not warrant a change in the dividend rate at this time.

Maryland Electric Railways, Annapolis, Md.—The Maryland Electric Railways has abrogated the lease which it held of the property of the Bay Ridge Company, at the Bay Ridge pleasure resort, and the lease of the Bay Ridge & Annapolis Railroad. The Baltimore *Star* says: "The lease was made by the Maryland Electric Railways with the Baltimore & Ohio Railroad a little over five years ago. At the time that Bay Ridge was in operation the Maryland Electric Railways, through the Annapolis Short Line Railroad, which it controls, operated the Bay Ridge & Annapolis Railroad, running from Annapolis Junction to the resort, for the Baltimore & Ohio Railroad, the Maryland Electric Railways receiving part of the revenue from the road. Later the company leased both the railroad and the property at Bay Ridge. The Bay Ridge resort has not been in operation for a number of years, and as no profit was derived from the resort or the railroad, the interests controlling the Maryland Electric Railways decided to end the lease."

Massachusetts Electric Companies, Boston, Mass.—J. H. Goodspeed, treasurer of the Massachusetts Electric Companies, said in a recent circular to the holders of the preferred stock of the company: "A dividend of 2 per cent per share has been declared and will be paid Jan. 1, 1913, on the preferred shares of record of Dec. 5, 1912. Preferred shareholders who have not already accepted the offer of Dec. 30, 1911, should, if they desire to participate in the dividend of Jan. 1, 1913, accept this offer before Dec. 5, 1912, as only in this event can the shares offered by circular of Dec. 30, 1911, carry the January dividend. The offer has been accepted by 187,339 shares out of 205,574 shares outstanding, and the trustees have voted that it be withdrawn on Dec. 5, except in such individual cases as in their opinion the interest of the trust may warrant."

Middle West Utilities Company, Chicago, Ill.—The Middle West Utilities Company has sold $3,000,000 of first and refunding mortgage 5 per cent gold bonds of the Central Illinois Public Service Company, Mattoon, Ill., to N. W. Halsey & Company, New York.

Muskogee (Okla.) Electric Traction Company.—The stockholders of the Muskogee Electric Traction Company have voted to increase the authorized capital stock of the company from $300,000 to $500,000.

Newport & Providence Railway, Newport, R. I.—The Newport & Providence Railway has filed a mortgage to the Augusta Trust Company, Augusta, Me., as trustee, to secure an issue of $300,000 of first mortgage 5 per cent twenty year bonds, dated July 1, 1912. The issue of $425,000 of first mortgage twenty year bonds, due 1925, which was outstanding, has been paid and cancelled.

New York State Railways, Rochester, N. Y.—The board of directors of the New York State Railways has been increased from nine members to fifteen members. The new directors are Harold P. Brewster and Robert M. Searle, Rochester; Allen C. Forbes, Syracuse; Charles B. Rogers, Utica; Alfred H. Smith, New York, and Harold Vanderbilt, New York.

Peoria (Ill.) Railway.—The amount of outstanding stock of the Peoria Railway has been increased from $1,000,000 to $1,010,000.

Portland, Eugene & Eastern Railway, Portland, Ore.—The Portland, Eugene & Eastern Railway has purchased from the Portland Railway, Light & Power Company the 9-mile railway known as the Willamette Falls Railway and will utilize the road as a portion of the new main line from Portland to Salem.

Seattle, Renton & Southern Railway, Seattle, Wash.—The Supreme Court of Washington has affirmed the appointment of Scott Calhoun and Joseph Parkin as receivers of the Seattle, Renton & Southern Railway by the Superior Court of King County. The Supreme Court says that the federal court of the District of Western Washington dismissed its receivers and admitted the prior jurisdiction of the State court. On the application of William R.

Crawford, former president of the company, Judge A. W. Frater of the Superior Court has decided to ask the Public Service Commission to value the physical property of the company.

Southern Traction Company of Illinois, East St Louis, Ill.—The stockholders of the Southern Traction Company of Illinois will meet on Dec. 31, 1912, to vote to increase the capital stock of the company to $7,500,000 and to authorize an issue of bonds not to exceed the sum of $7,500,000.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—The amount of outstanding stock of the Urbana & Champaign Railway, Gas & Electric Company has been increased from $500,000 to $750,000.

Washington (D. C.) Utilities Company.—On Nov. 25, 1912, the stockholders of the Washington Utilities Company and the Washington-Virginia Railway approved the merger of the companies. At the same time the Washington Utilities Company organized permanently by electing Frederic H. Treat, Wayne, Pa., president; Norman Gray, Camden, N. J., vice-president; Gardiner L. Boothe, Alexandria, Va., secretary; W. W. Spaid, treasurer. Three new directors were also elected, Clarence F. Norment, John F. Wilkins and Charles A. Spalding, Washington.

Dividends Declared

Chicago (Ill.) Elevated Railways, quarterly, 1½ per cent, preferred.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

Cleveland (Ohio) Railway, quarterly, 1¼ per cent.

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1½ per cent, common.

Pensacola (Fla.) Electric Company, preferred, 3 per cent.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAY COMPANY, PHILADELPHIA, PA.

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.,	Oct., '12		$415,921	.....	.....	.....	.....
1 "	" '11		397,931	.....	.....	.....	.....
4 "	" '12		1,778,169	.....	.....	.....	.....
4 "	" '11		1,716,872	.....	.....	.....	.....

ATLANTIC SHORE RAILWAY, SANFORD, MAINE.

1m.,	Oct., '12		$29,274	$25,286	$3,988	$465	$3,523
1 "	" '11		23,368	22,982	386	581	195

CLEVELAND, PAINESVILLE & EASTERN RAILROAD.

1m.,	Sept., '12		$38,884	$18,459	$20,425	$10,032	$10,393
1 "	" '11		34,677	19,534	15,142	8,641	6,501
9 "	" '12		294,335	160,879	133,455	89,264	44,191
9 "	" '11		279,592	151,126	128,465	74,374	54,091

DALLAS ELECTRIC CORPORATION.

1m.,	Sept., '12		*$147,473	$86,552	$60,920	$24,666	$36,253
1 "	" '11		*131,249	89,543	41,706	19,362	22,342
12 "	" '12		*1,762,241	1,101,550	660,691	275,430	385,261
12 "	" '11		*1,582,596	1,048,593	534,003	250,040	283,963

JOPLIN & PITTSBURG RAILWAY.

1m.,	Oct., '12		$47,357	$27,576	$19,781	$12,541	$7,240
1 "	" '11		43,568	23,934	19,634	12,923	6,711
12 "	" '12		519,707	306,614	213,093	153,503	34,943
12 "	" '11		459,216	272,284	186,932	151,989	34,943

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO.

1m.,	Sept., '12		$125,742	$66,377	$59,364	$35,168	$24,196
1 "	" '11		124,767	62,608	62,158	34,713	27,445
9 "	" '12		998,520	566,592	431,927	314,417	117,510
9 "	" '11		962,236	506,228	456,008	312,400	143,607

NORTHERN OHIO TRACTION & LIGHT COMPANY.

1m.,	Sept., '12		$268,073	$146,402	$121,671	$43,812	$77,859
1 "	" '11		246,015	128,812	117,202	44,320	72,882
9 "	" '12		2,247,866	2,019,746	990,294	394,362	595,932
9 "	" '11		2,019,746	1,110,504	909,241	399,069	510,172

PHILADELPHIA RAPID TRANSIT COMPANY.

1m.,	Oct., '12		$2,093,814	$1,239,640	$854,174	$759,121	$95,053
1 "	" '11		1,947,003	1,154,925	792,077	737,019	55,058
9 "	" '12		7,851,893	4,668,985	3,182,907	3,036,442	146,465
9 "	" '11		7,498,160	4,553,472	2,944,687	2,948,189	†3,502

TEXAS TRACTION COMPANY.

1m.,	Oct., '12		$53,587	$31,214	$22,372	$14,496	$7,876
1 "	" '11		45,027	26,327	18,700	14,388	4,312

*Includes taxes. †Deficit.

Traffic and Transportation

Hearing in Regard to Charge for Transfers by Middlesex & Boston Street Railway

The Massachusetts Railroad Commission gave a hearing at Boston on Nov. 26 upon the petition of the Aldermen of Waltham for the abatement of a charge of 1 cent for each transfer issued by the Middlesex & Boston Street Railway. For the company, Arthur A. Ballantine stated that the finances of the road render the taking off of this charge impracticable at present. The charge has been sanctioned by the board for each of the past four years as a part of a general plan of securing increased revenue in the district at the west of Greater Boston, and has met with little objection on the part of the traveling public. On the Framingham, Natick and Wellesley lines of the company the situation was met by the establishment and maintenance of a straight 6-cent fare, but the company's officers felt from the first that the denser traffic in the Waltham and Newton territory made a 5-cent fare more equitable, with an additional charge where a transfer is issued. Mr. Ballantine met the criticism of several speakers regarding the extension of the system to take in more or less unprofitable lines by the rejoinder that the consolidations effected have all been under the approval of the board itself and have been necessitated by the centralizing tendencies of the times. Economy of operation and improved service have resulted from them. Last year the company paid a dividend of 5.5 per cent, which is not a reasonable return upon the investment. Proper financial provision cannot be made to meet the needs of a broad administration unless a return of more than 5.5 per cent can be had upon the investment. Enough should be realized from operation to enable the company to set aside a surplus sufficient to meet emergencies. In the near future about $75,000 worth of new securities will have to be issued to meet the company's proportionate part of the cost of eliminating the Moody Street railroad crossing at Waltham.

George M. Cox, general manager of the company, stated that the revenue for the year ended June 30, 1912, on the Middlesex & Boston Street Railway, was $741,000; operating expenses, $498,000; net earnings, $243,000, leaving, after the payment of $162,000 fixed charges, $81,000 available for dividends of 5.5 per cent. The surplus for the year was only $688. There were issued in the year 786,000 transfers, giving a revenue from this source of $7,860, and of these, about 442,000 were issued in Newton and Waltham. The surplus was too small to justify a reduction of rates or a free transfer service. M. F. True, representing employees of the company, also spoke against the cutting out of the transfer charge, on the ground that such a reduction of the company's revenue might affect the pay of the men on the cars. The board took the case under advisement.

Near-Side Stops in Harrisburg.—The Central Pennsylvania Traction Company, Harrisburg, Pa., has adopted the practice of stopping its cars on the near side of the street. The company has also recently modified its transfer system.

Increase in Wages in Bangor.—The Bangor Railway & Electric Company, Bangor, Me., has increased the wages of its conductors and motormen 2 cents an hour in each class to the following scale: First two years, 20½ cents an hour; third and fourth years, 21½ cents an hour; fifth year and thereafter, 22½ cents an hour.

Accident on the Northern Electric Railway.—A car of the Northern Electric Railway, Chico, Cal., containing twenty passengers, was hurled from the trestle over Feather River near Marysville on Nov. 18, 1912, in a collision with a freight train. All of the passengers were injured and it was thought at first that three of them would die.

Traffic in New Haven on the Day of the Yale-Harvard Game.—In order to handle traffic on Nov. 23, 1912, during the football game between Yale and Harvard, the Connecticut Company had 150 extra cars in service, constantly moving from the railroad station and other parts of its system in New Haven and vicinity to Yale Field. About

30,000 people were handled in excess of normal riding for this period of the year and about 6000 more than on any previous big game day.

Decision in Saginaw Fare Case.—In the suit brought by the Saginaw & Flint Railway, Saginaw, Mich., the Genessee Circuit Court holds that the company must put into effect a 5-cent fare within the entire city limits of Saginaw as they now exist. The city some time ago annexed a considerable amount of territory through which the company operates. The company contended that the annexation did not affect its right to charge a second fare in the territory annexed and questioned the legality of the annexation of additional territory by the city.

Operating Agreement Between Chicago Railways and County Traction Company.—A tentative operating agreement has been made between the Chicago (Ill.) Railways and the County Traction Company. It provides that the Chicago Railways shall operate the lines of the County Traction Company, which extend to Morton Park and Cicero. The Traction company will continue to maintain the tracks. The tentative agreement has been approved by a subcommittee of the local transportation committee of the City Council.

Changes in Fare by Rockford & Interurban Railway.—The Rockford & Interurban Railway, Rockford, Ill., has made several changes in the rate of fares on the different divisions, although the ticket rate remains the same in nearly all cases. The company has discontinued the collection of fares according to what is known as fare limits, and now makes collections according to distance traveled. The company has placed on sale at $7.50 a new mileage book which contains 500 coupons. Not less than four coupons will be accepted for any one fare. Any distance over one-half mile is counted as one mile, but distance less than one-half mile is not counted.

Reduction in Bridge Fare in New York.—The Bridge Operating Company, New York, announced that effective Dec. 1, 1912, it would comply with the order of the Public Service Commission for the First District directing the company to reduce the local car fares over the Williamsburg Bridge over the East River from 3 cents to 2 cents for one-way trips, or from two tickets for 5 cents to three tickets for 5 cents. As noted in the Electric Railway Journal Nov. 23, 1912, page 1086, the Appellate Division of the Supreme Court of New York, First Department, in a decision handed down on Nov. 15, 1912, upheld the order of the commission directing the reduction in fare.

Changes in Trail Cars of the Louisville & Northern Railway & Lighting Company.—The Louisville & Northern Railway & Lighting Company, New Albany, Ind., is putting its Daisy division trail cars through the American Car & Foundry Company's plant. A number of changes are to be made. They are to have steel underframing and steel sides and the high platforms are to be lowered. This latter change will eliminate the three-tread step, which will increase safety. The drawbar draft gear will be so arranged that the train line strain will be distributed principally on the steel underframing which runs the full length of the car, instead of on the car body, as formerly.

Fare of 10 Cents Between Trenton and Yardley Upheld.—The Court of Errors and Appeals of New Jersey has upheld the 10-cent fare between Trenton and Yardley and filed an opinion in which it is asserted that former Mayor Walter Madden of Trenton was not warranted in revoking the licenses of several cars of the New Jersey & Pennsylvania Traction Company. Mr. Madden revoked the car licenses and demanded that the company carry passengers to Yardley for 5 cents under what he believed was the requirement in an agreement between the company and the city of Trenton. The court held, however, that the contract was wholly between the company and the city and that it referred only to the lines of that company.

Opinion in Regard to Damage Claims Against the St. Louis Transit Company.—The Supreme Court of Missouri, in an opinion by Judge Lamm, holds that the United Railways, St. Louis, Mo., is liable for all judgments for personal injuries outstanding against the St. Louis Transit Company, which was taken over by the United Railways in October, 1904. This decision was rendered in the suit brought by J. Brooks Johnson and others in the St. Louis Circuit to recover judgments aggregating $63,833.91 which they owned and held against the St. Louis Transit Company. Judge Lamm in his opinion said in part: "Every interested party seems to have been represented in body or mind, in one step or other of the transaction (merger), except those holding claims for injuries. They were uninvited, unrepresented and conspicuous by their absence unless the majesty of the law attended the affair as their guardians. The St. Louis Court of Appeals thought it did, and we are of that mind."

Agreement with Employees in Charleston.—The Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has entered into an agreement with its employees covering wages and terms of service to be in effect for two years. P. H. Gadsden, president of the company, has issued a statement in part as follows: "We have been able to arrive at a satisfactory agreement for a period of two years with our men. The position which the company took in expressing its willingness to recognize the organization of the men left the matter of the rate of compensation as the only question open for consideration. This matter has been successfully solved by mutual concessions on the part of the men and the company." The increase in wages is as follows: Extra men, 17 cents per hour, instead of 16 cents; regular men, 19 cents per hour, instead of 18 cents; all men in the service two years, 20 cents per hour; all men in the service four years or over, 21 cents per hour, instead of 19 cents.

Elevated Transfer Case in Chicago.—The city of Chicago has filed a brief in the case pending in the Circuit Court of Cook County, in which the city seeks to compel the elevated railways to give universal transfers. The brief charges the companies with an attempt to deceive the public as to the actual ownership of stock in the three operating corporations concerned. The city claims that there is one ownership of the properties and that it should be unlawful to exact more than one fare for a single ride anywhere on the system. It contends that the elevated railways are street railways and amenable to the law as such. The contention of the companies is that they are commercial railroads as distinguished from street railways and are therefore not affected by the same laws. The city declares that the companies carry passengers exclusively. In answer to the contention of the companies that the 2-cent-a-mile passenger rate law in the State of Illinois takes from the city the right to regulate fares on such properties, the city declares that the law was intended to apply from one city to another, but not to rides which are entirely within any one municipality.

Decision in New Jersey Fare Case.—The Public Utility Commission of New Jersey has decided that the demand of the Mayor and the Council of North Arlington that the fare zone on the Public Service Railway be changed so as to include North Arlington Borough, and thereby include all of the township of Union, in which the borough is situated, is an unreasonable one. The Council contended that it was a discrimination against the borough for the Public Service Railway to charge two fares between the municipality and Newark when in larger fare zones only a single fare is charged. The commission, in its opinion, said: "It must be considered that with a ride from Belleville turnpike to Newark is included a transfer privilege reaching out of Newark in all directions and approximating in some distances 15 miles. It appears from the testimony that the company is operating in said borough under a certain ordinance given by the township of Union, in which the said borough is located, and which, by its terms, constitutes a contract between the parties and provides that the rate of fare for the transportation of any single passenger shall not exceed the sum of 5 cents for any distance in one direction within the limits of said township. From the above it follows that if the fare zone be changed at all to include any part of the borough it must extend, according to the terms of the ordinance, to the northerly limits of the township of Union. This point is distant from Broad and Market Streets, in Newark, 7.26 miles. Add to this the transfer privileges referred to and there would be in some instances a ride of 22 miles for 5 cents."

Personal Mention

Mr. W. E. Thompson has been appointed car accountant of the Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., to succeed Mr. E. E. Sherman, resigned.

Mrs. Helen S. Turner, Albany, N. Y., has been appointed secretary to Commissioner Curtis N. Douglas of the Public Service Commission of the Second District of New York.

Mr. Fred Forcht, who has been a member of the legal staff of the Louisville (Ky.) Railway, has resigned to engage in private law practice. Mr. Forcht's resignation will take effect on Jan. 1, 1913.

Mr. Everett L. Putnam has been appointed superintendent of the Westfield division of the Springfield (Mass.) Street Railway. Mr. Putnam was formerly starter of the company at Main and Carew Streets, Springfield.

Mr. J. M. Winterbotham has resigned as secretary of the Railroad Commission of Wisconsin to devote his time to private interests. Mr. Winterbotham has long been actively engaged with the Wisconsin commission and has been closely identified with its progress and development.

Mr. E. O. Shryock, superintendent of the Northwestern Pennsylvania Railway Company, Meadville, Pa., has had his duties extended to include the Meadville & Cambridge Springs Street Railway and the Erie Traction Company, which properties have recently been taken over by the Northwestern Pennsylvania Railway Company.

Mr. E. E. Clark, of Iowa, has been reappointed a member of the Interstate Commerce Commission by President Taft. His term of office as a member of the commission would have expired in December. Mr. Clark was formerly president of the organization which represents the railroad conductors. His new term will run for seven years.

Mr. Vernon Mellott has been appointed master mechanic of the Galesburg & Kewanee Electric Railway, Kewanee, Ill., to succeed Mr. C. P. Orth, who resigned recently on account of ill health. Mr. Mellott resigned as assistant shop foreman of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to take the new position. His appointment is effective on Dec. 1.

Mr. William W. Crawford, a member of the Louisville law firm of Gibson & Crawford, will succeed Attorney Fred Forcht, who recently resigned from the Louisville (Ky.) Railway and additional work will be assigned to Mr. Howard B. Lee, who has been in the railway's legal department several years. Mr. Crawford and Mr. Lee, together with Mr. Frank P. Straus as senior member in damage actions, will handle the company's litigation with Mr. Joseph Selligman. Mr. Crawford will continue as a member of the firm of Gibson & Crawford.

Mr. George W. Dunlap has been appointed mechanical engineer of the International Railway, Buffalo, N. Y. Mr. Dunlap was formerly electrical engineer of the Public Service Commission of the First District of New York in charge of the bureau of transit inspection under Mr. E. G. Connette, now vice-president of the International Railway. Mr. Dunlap was born in North Berwick, Maine. His first work was with the Portland Locomotive Works, Portland, Maine. From 1884 to 1891 he was a locomotive engineer on the New York & New England Railroad running between Boston and Hartford and Boston and Willimantic. For three years Mr. Dunlap was employed at the Magid-Hope silk mills in Milford, Mass., which he equipped for electric operation. Subsequently he installed a 2600-hp electric plant for the Stevens Manufacturing Company at Fall River, Mass., and then became consulting engineer for the Davoll mills at Fall River. Mr. Dunlap was also chief engineer of the Waltham Gas & Electric Company, Waltham, Mass.; chief engineer of the Newton (Mass.) Street Railway and chief engineer of the Hyde Park Electric Company, which furnishes power to the Suburban Street Railway, and equipped the power plant of the Biddeford & Saco Street Railway, Biddeford, Me. Before becoming connected with the Public Service Commission of New York Mr. Dunlap was engineer of power stations of the Worcester (Mass.) Consolidated Street Railway. Mr. Dunlap is a member of the American Society of Mechanical Engineers.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS.

***Lookout Mountain Railway, Birmingham, Ala.**—Incorporated in Alabama to build an electric railway from Gadsden to the top of Lookout Mountain near Noccalulu Falls. Capital stock, $100,000.

***Chicago & Northern Interurban Railway, Chicago, Ill.**—Incorporated in Illinois to build an electric, interurban railway to connect Chicago, Niles, Maine and Wheeling. Headquarters, Chicago. Capital stock, $100,000. The incorporators and first board of directors are: W. A. Miller, F. W. Hochspeier, O. J. Smith, W. E. Swanson and G. L. Starbird, all of Chicago.

***Louisiana Traction & Power Company, Lafayette, La.**—Application for a charter has been made in Louisiana by this company to build an electric railway from Lafayette to the Sabine River, and from Lafayette to Morgan City, Alexandria and Abbeville. Capital stock, $250,000. Headquarters, Lafayette. Officers: J. A. Landry, Lake Charles, president; S. T. Woodring and T. J. Bird, vice-presidents; D. J. Landry, treasurer, and P. O. Moss, secretary. E. E. Shackford, Lynn H. Dinkins, New Orleans, and Frank Roberts are among the directors.

***Bartlesville Gas, Electric & Railway Company, Bartlesville, Okla.**—Chartered in Delaware with a capital stock of $1,000,000 to succeed the Bartlesville Interurban Railway.

***Monessen (Pa.) Southwestern Railway.**—Incorporated in Pennsylvania to build an electric railway from Monessen to Charleroi, along the Allegheny River, a distance of about 3 miles. Capital stock, $30,000. Wallace H. Rowe, Pittsburgh, president.

***Wilkes-Barre & Hanover Street Railway, Wilkes-Barre, Pa.**—Chartered in Pennsylvania to build an electric railway in Hanover. Capital stock, $12,000.

***Farmers' Interurban Electric Railway, Montreal, Que.**—Application for charter will be made by this company at the next session of the Legislature to build an electric railway from Rivière des Prairies to Ste. Anne de Bellevue. Capital stock, $1,000,000.

Riviera Beach & Western Railway, Riviera, Tex.—Chartered in Texas to build a 35-mile electric raliway from Riviera Beach to Falfurrias. Capital stock, $35,000. Incorporators: Theodore F. Koch, Carl C. Henny, Herbert Roedenbeck, Sidney Niblo and Samuel F. Lilligren, Houston; S. A. Robertson, San Benito; Richard M. Kleberg, Kingsville; Marcus Phillips, Riviera, Tex., and P. H. Hansen and Robert Schwandt, Chicago, Ill. [E. R. J., Aug. 31, '12.]

FRANCHISES

Little Rock, Ark.—The Arkansas Interurban Construction Company has asked the Council for a franchise in Little Rock. The company will soon ask the Council of Hot Springs for a franchise in Hot Springs. This is part of a plan to build an electric railway to connect Little Rock and Hot Springs. L. Garrett, Little Rock, secretary.

Los Angeles, Cal.—The City Council of Los Angeles has voted to authorize the Board of Public Works to advertise for bids for the construction of the proposed municipal railway from Aliso Street to Ninth Street on San Pedro Street, in Los Angeles, and also to advertise for sale the operative franchise on this railway. The time set for opening bids on the franchise is Dec. 10. The City Council has approved the plans and specifications for this railway, as prepared by the city engineer. [E. R. J., Oct. 26, '12.]

***Huntington Park, Cal.**—The Board of Trustees has been asked to grant a fifty-year street railway franchise in Huntington Park.

Pacific Grove, Cal.—The Monterey & Pacific Grove Railway has asked the City Council for a fifty-year franchise in Pacific Grove.

San Diego, Cal.—The San Diego, Riverside & Los An-

geles Railroad has abandoned its route through Balboa Park and will ask for another entrance to San Diego from the city limits on the east. This line will connect San Diego and Los Angeles. Maurice Salzeman, Los Angeles, president. [E. R. J., Aug. 10, '12.]

Stockton, Cal.—The Stockton Terminal & Eastern Railroad has asked the Council for a fifty-year franchise to extend and reconstruct some of its lines in Stockton.

Keysport, Ill.—The Springfield & Central Illinois Traction Company has asked the Village Board for a franchise to operate its interurban line through Keysport. A franchise will soon be asked of the Council at Greenville.

Lincoln, Ill.—The Lincoln Railway & Light Company will ask the City Council for a franchise to extend its railway on Eighth and College Streets in Lincoln.

Newton, Ill.—The City Council has granted a fifty-year franchise to the Springfield & Central Illinois Traction Company. The Jasper County Supervisors have granted the company a franchise to use the public highway for its line.

Cedar Grove, Ind.—The Indianapolis & Cincinnati Traction Company has received a franchise in Cedar Grove.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company has received franchises from the City Council over Goff Avenue and for the Jule Street loop in St. Joseph.

Paterson, N. J.—The Board of Public Utility Commissioners has approved the franchise granted to the Public Service Railway by the Council of Paterson for the extension of its line in Paterson.

Texas City, Tex.—The Texas City Street Railway has received a franchise in Texas City. This is part of a plan to build an electric railway between Texas City and Texas City Junction. H. B. Moore is interested. [E. R. J., Nov. 23, '12.]

Bountiful, Utah.—The Utah Light & Railway Company has asked the Council for a franchise to build a line through Bountiful.

Provo, Utah.—The Utah Interurban Electric Company, Salt Lake City, has asked the County Commissioners for a fifty-year franchise to operate a single-track and double-track electric railway over the county highway from the north to the south limits of the county. John MacGinnis is interested. [E. R. J., Nov. 2, '12.]

Morgantown, W. Va.—The Morgantown Interurban Railway has asked the Council for a franchise to build an electric line in Morgantown. This is part of a plan to build a railway to connect Morgantown and Point Marion via Star City. J. H. McDermott, president. [E. R. J., Feb. 10, '12.]

Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has agreed to accept a franchise down Wells Street from Eleventh Street to West Water Street in Milwaukee.

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—This company placed in operation on Nov. 9 its new line over the new free bridge and viaduct over the Iron Mountain tracks into Van Buren.

Arkansas Interurban Construction Company, Little Rock, Ark.—This company has been incorporated in Arkansas with a capitalization of $500,000 to build the Little Rock & Hot Springs Electric Railway, which will extend from Little Rock to Hot Springs. Officers: W. H. Garanflo, Little Rock, president; W. S. Sorrells, Hot Springs, vice-president; O. D. Tucker, Little Rock, vice-president; L. Garrett, Little Rock, secretary and general manager; M. B. Moore, Little Rock, treasurer.

Pacific Electric Railway, Los Angeles, Cal.—This company will begin work at once on the construction of a new line on Lincoln Avenue in Pasadena. The $20,000 bonus to be paid the company by property owners along Lincoln Avenue has been subscribed

Wilmington & Southern Traction Company, New Castle, Del.—This company will soon place in operation its new cut-off between Dobbinsville and Wilmington.

***Orlando, Fla.**—A company has been formed and most of the right-of-way secured to build an electric railway between Orlando and Winter Park. This line will be extended eventually to Sanford and Kissimmee. Among those interested are T. P. Warlow, E. T. Sperry, L. L. Payne, C. R. Harper and H. C. Dann, of Orlando, and W. C. Temple, of Winter Park.

***St. Petersburg, Fla.**—Plans are being made by Frank D. Butler to build an electric railway in St. Petersburg to Pinellas Park.

Waycross Street & Suburban Railway, Waycross, Ga.—This company placed in operation on Nov. 16 its new line to Winona Park. Work has been begun by the company on its extension to Gilchrist Park.

***Twin Falls, Idaho.**—I. B. Berrine, Twin City, plans to build an electric line from Twin Falls to Shoshone Falls, Snake River, a distance of 10 miles. It is said that he contemplates using storage battery cars.

La Salle County Electric Railroad, Chicago, Ill.—This company, which is constructing a line between Ottawa and Mendota, will hold a meeting on Dec. 5, when action will be taken to change the principal office to Ottawa and plans will be considered for financing the line. George H. Dodge, Chicago, president. [E. R. J., Sept. 7, '12.]

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—Surveys have been completed by this company for its line through Laurel.

Louisville & Interurban Railway, Louisville, Ky.—This company has awarded a contract to the Hoke Company, Louisville, for grading and furnishing the ballast for 3 miles of double track with which the company will replace its present line between St. Matthew's and Beechwood Junction in Jefferson County.

Louisville (Ky.) Railway.—This company placed in operation on Nov. 12 its new cross-town line in Louisville.

Chambersburg, Greencastle & Waynesboro Electric Railway, Hagerstown, Md.—Work has been begun by this company on its extension from Highfield, on the mountain east of Pen-Mar, to Monterey, a distance of nearly a mile.

Kalamazoo-Grand Rapids Electric Railway, Kalamazoo, Mich.—This company, which is a subsidiary of the Michigan United Traction Company, has awarded a contract for 7500 tons of steel rails to the Illinois Steel Company for tracking the main line between Kalamazoo and Grand Rapids. The roadbed will be laid with 80-lb rails. The Ohio Brass Company has been awarded the contract for the bonds and the American Steel & Wire Company received the contract for the steel wire fencing. [E. R. J., Oct. 26, '12.]

Laurel Light & Railway Company, Ellisville, Miss.—This company has awarded the contract for grading the interurban line between Laurel and Ellisville to N. G. Gardinier. Guy M. Walker is interested. [E. R. J., Oct. 12, '12.]

St. Louis-Kansas City Electric Railway, St. Louis, Mo.—It is reported that construction will be begun by this company within the next thirty days on the construction of its line between St. Louis and Kansas City, via Blue Springs, Oak Grove, Odessa, Higginsville, Marshall, Arrow Rock, New Franklin and Columbia. D. C. Nevin, Kansas City, president. [E. R. J., March 4, '12.]

Public Service Railway, Newark, N. J.—This company has been asked to consider plans to extend its Central Avenue line from the present terminus, just west of Harrison, in East Orange, to Lincoln Avenue, Orange.

***Oneonta & Eastern Railroad, Oneonta, N. Y.**—This company has been organized to build an electric railway from Oneonta to Cobleskill via West Davenport, Davenport Center, Davenport, Fergusonville, Simpsonville, Summit and Richmondville. Officers: W. D. Greenleaf, Charlotteville, president; Charles G. Payne, Charlotteville, vice-president; F. W. Olmstead, secretary, and B. W. Hoye, Oneonta, treasurer.

Utica Southern Railroad, Utica, N. Y.—It is reported that this company will build a branch from Norwich to Utica.

Charlotte (N. C.) Rapid Transit Company.—This company has awarded a contract to build a line from Heath Corner and Piedmont Park in Charlotte to the Mecklenberg Country Club to Tucker & Laxton, Charlotte.

Northern Ohio Traction & Light Company, Akron, Ohio.—Councilman Esch has introduced a resolution in the Akron City Council calling upon the Northern Ohio Traction & Light Company to double-track its entire system in Akron and extend several of the lines, some of them beyond the city limits. Where the company has no franchise it is proposed to grant one, if it is assured that the line will be built.

Cincinnati, Louisville, Lexington & Maysville Traction Company, Cincinnati, Ohio.—This company has completed grading its right-of-way between Jonesville and Owenton, Ky., and will begin work on the Owenton division in the immediate future. The residents of Owen County have subscribed considerable stock in the enterprise.

Lake Shore Electric Railway, Cleveland, Ohio.—This company has been asked to consider plans to build an extension in Cleveland to the East End factory district.

Tri-State Traction Company, Steubenville, Ohio.—This company plans to extend its line to Weirton, W. Va.

***Zanesville, Ohio.**—It is reported that right-of-way has been secured and surveys will be made at once for the construction of an electric railway between Zanesville and Cambridge. W. Hunter Atha, Zanesville, is interested.

Ardmore & Waurika Railway, Ardmore, Okla.—This company announces that it will operate this railway with steam and not by electricity, as reported in the ELECTRIC RAILWAY JOURNAL of Nov. 2, 1912.

Lehigh Valley Transit Company, Allentown, Pa.—Announcement has been made by this company that it will place in operation on Dec. 12 its new Philadelphia-Allentown route from the Sixty-ninth Street and Market Street terminal, Philadelphia.

Johnstown & Altoona Railway, Johnstown, Pa.—Nearly all the right-of-way has been obtained by this company between Altoona and Johnstown. One of the connecting links is under construction between South Fork and Portage. G. U. G. Holman, general manager. [E. R. J., April 20, '12.]

Reading, Pa.—It is stated that Philadelphia capitalists plan to build an electric railway to connect Philadelphia, Reading, Lancaster and Harrisburg. The names of those interested are not yet reported.

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—Work has been begun by this company on an extension from Highfield to Monterey Lane in Waynesboro.

***Charleston-Isle of Palms Traction Company, Charleston, S. C.**—Plans are being made by this company to build a 35-mile electric railway to connect McClellanville, Awensdaw and Mount Pleasant. Rights-of-way have been secured between McClellanville and Awensdaw, a distance of 12 miles. Headquarters, New Charleston Hotel Building, Charleston. Officers: James Sottile, Charleston, president, and W. W. Fuller, chief engineer and general superintendent.

Sioux Falls & Southern Minnesota Traction Company, Pierre, S. D.—Preliminary work in securing options for rights-of-way for this railway has been completed. It is expected to interest capital and have construction started in the spring from Sioux Falls to Albert Lea, with a branch north from Wells to a connection with the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company. W. H. Knight is interested. [E. R. J., July 20, '12.]

Knoxville Railway & Light Company, Knoxville, Tenn.—This company has just had recorded deeds for twenty-six pieces of property lying along the route or right-of-way for the Vestal Street line now under construction.

***Denison, Tex.**—John R. Cullinane, St. Louis, and associates plan to build an electric railway between Denison and Durant, and possibly northwest from Durant toward Oklahoma City.

Fort Worth, Mineral Wells & Northwestern Railway, Fort Worth, Tex.—About $300,000 of preferred stock has been subscribed in Fort Worth for the construction of this railway. Surveys will soon be made, and according to the present plans of the company the line will connect Fort Worth and Mineral Springs, via Azle, Springtown, Poolville, Agnes, Adell, Authon and Blue Springs. W. E. Brown, Fort Worth, is interested in the project. [E. R. J., Sept. 7, '12.]

Houston (Tex.) Electric Railway.—Work has been begun by this company at Fifteenth Street and Harrisburg Road, Central Park, for the Central Park and Magnolia Park extension to connect the harbor district with the business center of Houston.

Interurban Construction Company, Salt Lake City, Utah.—This company, which was incorporated under the laws of Maine, has filed a certified copy of its articles of incorporation with the county clerk in Salt Lake City. The object of the company is to construct the Salt Lake & Utah Railroad, which is to be an interurban line between Salt Lake City and Layson. The company is capitalized at $1,500,000. Officers: E. A. Turner, Portland, Me., president; F. M. Orem, Salt Lake, treasurer, and Carl W. Smith, director. [E. R. J., Nov. 2, '12.]

West Virginia Traction & Electric Company, Wheeling, W. Va.—Plans are being made by this company to build two new bridges over Wheeling Creek in the near future.

SHOPS AND BUILDINGS

Central California Traction Company, San Francisco, Cal.—This company plans to build a new freight depot at Gerber.

Washington-Virginia Railway, Washington, D. C.—This company plans to build a new freight station on Royal Street between Franklin Street and Jefferson Street in Alexandria.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company is building an extension to its freight yards in Lexington. The company has also begun dismantling a mammoth gas tank on property which it owns at Main and Patterson Streets in Lexington and will improve this site with an additional interurban freight house and larger yards at the terminal there.

Youngstown & Ohio River Railroad, Youngstown, Ohio.—Plans are being considered by this company to build a new union station in Salem. The structure to be used by this company and the Stark Electric Railroad, Alliance.

Oregon Electric Railway, Portland, Ore.—The erection of stations at various places on this line between Albany and Eugene is rapidly nearing completion. The stations at Harrisburg and Junction City are practically completed. Both of these structures are 30 ft. x 108 ft. Four stations, each of which is 30 ft. x 60 ft., are now being constructed. These are situated at Blevin, Fayetteville, Tulsa and Enid. At Pirtle and Cartney the stations are in the substation building. Shelter sheds have been constructed by this company at Oakville, Potter and Nixon, and work on them is now being carried on at Milorn, Meadowville, Awbrey and Avard.

POWER HOUSES AND SUBSTATIONS

Kankakee & Urbana Traction Company, Urbana, Ill.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 300-kw, 600-volt, 25-cycle d.c. rotary converter; three 110-kva, 3300 to rotary voltage O. I. S. C. transformers and one switchboard for control of same.

Kokomo, Marion & Western Traction Company, Kokomo, Ind.—This company expects to purchase one 3500-kw turbo-generator set and 1500 hp in boilers to be installed next year.

Eastern Pennsylvania Railways, Tamaqua, Pa.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 500-kw, 600-volt, six-phase, 25-cycle d.c. commutating-pole rotary converter; three 185-kva, 11,000 to rotary voltage O. I. S. C. transformers and one switchboard for same.

Charleston, (W. Va.) Traction Company.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for two 300-kw, 600-volt, three-phase, 60-cycle d.c., rotary converters; six 110-kva, 6600 to rotary voltage O. I. S. C. transformers and two switchboards, one for the main station and one for the substation, to be used in connection with the above.

Manufactures and Supplies

ROLLING STOCK

Philadelphia (Pa.) Rapid Transit Company has ordered one long-broom snow sweeper from The J. G. Brill Company.

Keokuk (Ia.) Electric Company has ordered from the St. Louis Car Company one car body mounted on a St. Louis No. 46 truck.

El Paso (Tex.) Electric Railway has ordered from the St. Louis Car Company six car bodies mounted on St. Louis No. 47-B trucks.

Manhattan Bridge Three Cent Line, New York, N. Y., has ordered one short-broom snow sweeper from The J. G. Brill Company.

Moncton Tramways, Electricity & Gas Company, Moncton, N. B., expects to order two semi-convertible cars during the next few weeks.

Easton (Pa.) Rapid Transit Company has ordered three 20-ft. 8 in. semi-convertible pay-within motor cars from The J. G. Brill Company.

People's Gas & Electric Company, Burlington, Ia., has ordered one car body from the St. Louis Car Company mounted on a St. Louis Warner non-parallel axle truck.

Michigan United Traction Company, Jackson, Mich., is preparing specifications for ten or twelve all-steel interurban cars. This company is also rebuilding several of its old interurban and city cars.

Michigan Railway Engineering Company, Kalamazoo, Mich., has not yet decided on type, size or number of cars that will be required on the Kalamazoo-Grand Rapids Electric Railway, which is now under construction.

Santa Barbara (Cal.) Consolidated Electric Railroad has ordered, through Pierson, Roeding & Company, five 39-ft. 4-in. semi-convertible center-entrance pay-as-you-enter cars mounted on Brill 62-E trucks from The J. G. Brill Company.

Brooklyn (N. Y.) Rapid Transit Company has notified the Public Service Commission of the First District that it will place an order for 600 new steel side-door cars just as soon as the operating contracts for the new dual subway system are signed. These new cars will be used on the present elevated system as well as in the subway.

TRADE NOTES

Hunter Illuminated Car Sign Company, Flushing, N. Y., has received orders from The Milwaukee Electric Railway & Light Company, Milwaukee, Wis, for complete equipments of Hunter destination signs for all of its cars in Racine.

W. N. Matthews & Brother, St. Louis, Mo., announce that they are now represented on the Pacific Coast by L. E. Sperry in San Francisco, Cal., B. C. Chase in Los Angeles and by H. G. Behneman in Seattle to succeed the John R. Cole Company, which has acted as agent for the company in those cities.

Ford & Johnson, Michigan City, Ind., report that they have recently received an order from the Cincinnati, (Ohio) Traction Company for the seats for seventy-six cars, from the Indianapolis Traction & Terminal Company for the seats for twenty-five cars and from the Metropolitan Street Railway, Kansas City, Mo., for the seats for twenty-five cars.

General Electric Company, Schenectady, N. Y., has received a contract from the International Railway, Buffalo, N. Y., for supplying the 100 new near-side cars with 100 two-motor car equipments, each composed of two GE-201 railway motors, K-36 controllers for single end operation and straight air brake equipments with the CP-27 type of air compressor.

New Castle Steel & Iron Company, Columbus, Ohio, has completed negotiations for the purchase of the plant of the New Castle Forge & Bolt Company, New Castle, Pa., with a view of using the works as a nucleus for a steel car plant. The company recently was incorporated in Pennsylvania with a capital stock of $100,000. The incorporators named are W. H. Schoen, E. N. Ohl, George P. Rhodes, A. B. Berger and E. H. Brainard, of Pittsburgh.

H. W. Johns-Manville Company, New York, N. Y., has opened a new warehouse at 31½ South Broad Street, Atlanta, Ga. The entire building, embracing three floors and a basement, with a total floor area of about 10,000 sq. ft., will be utilized exclusively as a warehouse for a stock of such J-M products as roofing, boiler and pipe coverings, cements, packings, fire extinguishers, electrical, railway and automobile supplies. The Atlanta office of the company will be located in the same building with the local warehouse.

Sterling Fare Register Company, Newark, N. J., announces that its plant and equipment have been purchased by C. E. Vehslage, of Newark, N. J. The factory and office of the company will be moved to the works of the Bonney-Vehslage Tool Company. The business will be conducted under the same name as formerly—the Sterling Fare Register Company. The new management will, however, carry into effect several important improvements in the manufacture of the Sterling registers. Three types of registers will be manufactured. Two of these, known as No. 5 and No. 15, are of the single type and one, No. 16, is a double register for both transfers and cash fares.

R. D. Tomlinson has resigned as manager of the condenser and steam-engine department of the Allis-Chalmers Company, Milwaukee, Wis., to become vice-president and general manager of the Grangers Lime & Marble Company, Danbury, Conn. Mr. Tomlinson came to New York with the John F. Bushnell Company and later became power-plant engineer for the Interborough Rapid Transit Company, leaving that position to become manager of the condensing department of the Allis-Chalmers Company, where he was later made manager of the steam-engine department also. He is a member of the American Society of Mechanical Engineers, past-president of the National Association of Stationary Engineers, and one of the founders of the Institute of Operating Engineers.

British Ackley Brake & Supply Company, London, England, has been established with offices at the Westinghouse Buildings, Norfolk Street, Strand, London, W. C., to deal more effectively with the sale of the Ackley adjustable and no-staff brakes in England and certain parts of the Continent. The new company takes over the business of the British Ackley Brake Company, which has been under the joint management of G. S. Ackley, W. L. Lorkin and E. E. Daglish for the last few years, all of whom will serve on the directorate of the new concern. It will conduct its business on broader lines, having added Belgium, Holland, Norway, Sweden and Denmark to its original territory. In addition to handling Ackley brakes, other new tramway and railway specialties, for which the world's rights are controlled by the various Ackley companies, will be introduced. Among the European countries in which Ackley brakes are now being manufactured are England, Germany, Austria, France, Belgium, etc., and contracts have already been placed aggregating over 10,000 brakes. This number does not include Ackley adjustable brakes, which will be supplied by American and Canadian factories for export outside of these two countries. The Ackley companies have at present in hand orders amounting to over 1000 Ackley adjustable brakes and more than 500 no-staff brakes, the greater portion of which will be of European manufacture.

ADVERTISING LITERATURE

The J. G. Brill Company, Philadelphia, Pa., has issued Catalog No. 204, which describes and illustrates the various types of Brill car seats manufactured by the company.

H. W. Johns-Manville Company, New York, N. Y., has issued a booklet entitled "A Fire Department in Your Building" in which the J-M Success liquid chemical fire extinguisher is briefly described and illustrated.

Oxweld Acetylene Company, Chicago, Ill., has issued a thirty-two-page catalog entitled "Cutting the Cost with the Oxweld Process," which deals with the work that can be accomplished with this process. It contains numerous illustrations, together with the descriptions and detailed costs, which have been selected as typical of some of the every-day problems in the industries represented.

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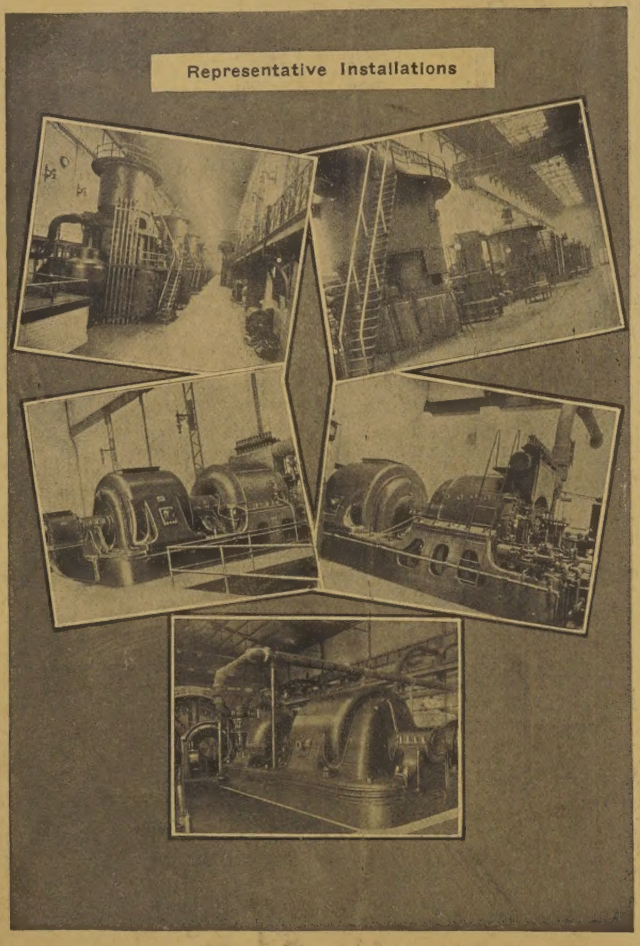
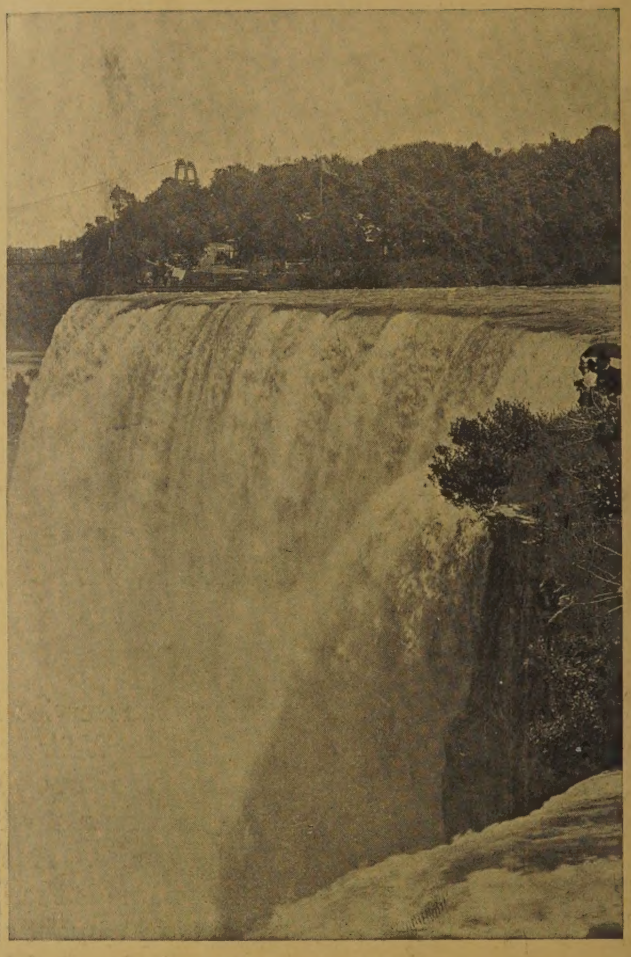


NIAGARA



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San Francisco, Cal.
St. Louis, Mo.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Youngstown, Ohio

For Texas and Oklahoma business refer to General Electric Company of Texas,—Dallas, El Paso, Houston and Oklahoma City
For Canadian business refer to Canadian General Electric Company, Lt'd, Toronto, Ont.

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